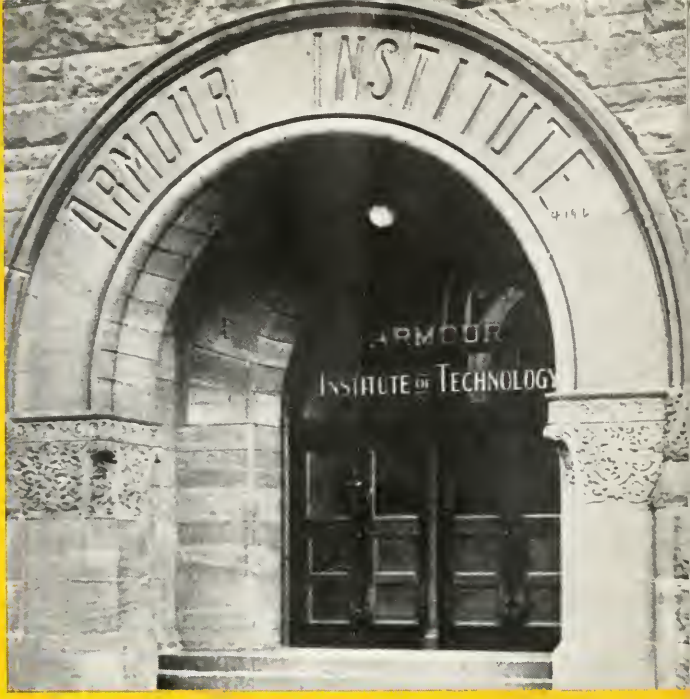


Armour ENGINEER and Alumnus

CTOBER
—NOVEMBER
1935

Old Tankard ALE

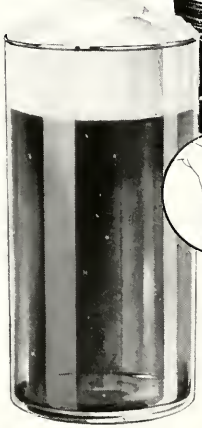
brewery flavor sealed in Non-refillable

. . . KEGLINED TapaCan

OLD TANKARD ALE—a hearty drink for hearty fellows. The good old-time flavor—full-bodied, full-strength, brewed and mellowed by Pabst—is caught at the brewery vats and held fixed in the sealed, non-refillable Keglined TapaCan. No light can enter to steal away the delicate goodness that makes Old Tankard the ale of ales.

Order a case today. Flat at top and bottom, the Keglined TapaCan stacks easily in the refrigerator and on pantry shelves. And it cools quickly—so you are always ready to serve yourself or your guests with the ideal beverage—genuine good Old Tankard Ale.

- PROTECTED FLAVOR
- NON-REFILLABLE
- STACKS EASILY
- SAVES HALF THE SPACE
- BREWERY GOODNESS SEALED RIGHT IN
- NO DEPOSITS
- NO BOTTLES TO SAVE
- COOLS FASTER



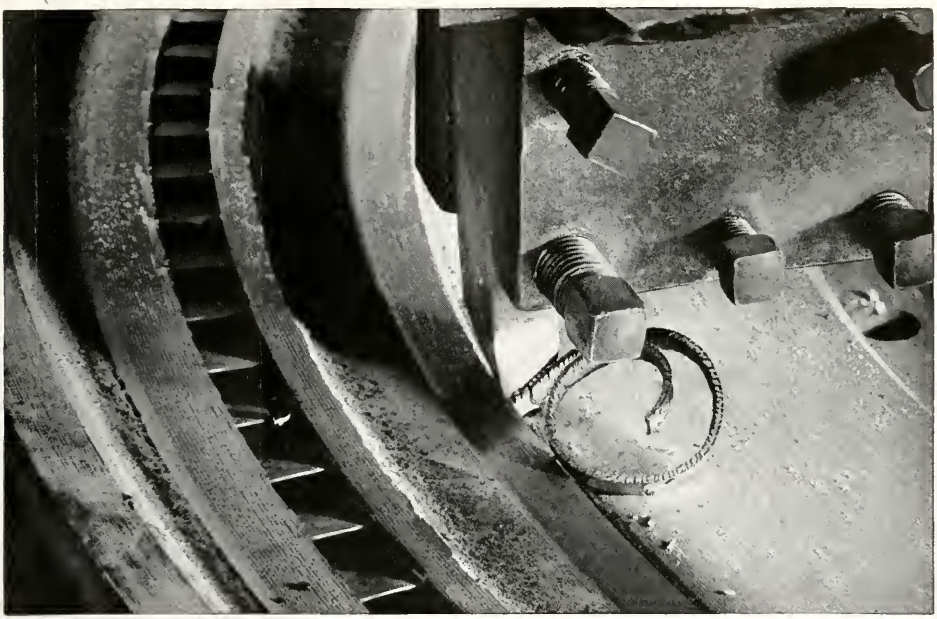
EXTRA VALUE

Handy New Opener FREE

With 3 or more TapaCans your dealer will give you the Quick and Easy opener FREE. A perfect opener for all cans containing liquids. Simply hook opener under rim and pull up. Easy, quick, simple to use.

Old Tankard Ale

Brewed and Mellowed by Pabst



FROM STONE TO STEEL

THOUSANDS of years ago, a skin-clad workman pounded away with a cobblestone on a slab of hard rock. In a few years, that slab might be passably square and smooth.

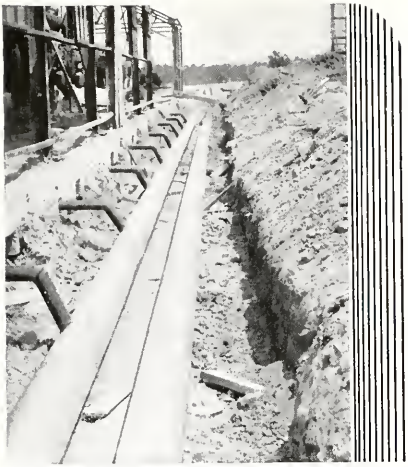
Today, busy machines, supervised by trained workmen, pare off crisp, curling ribbons from whirling blocks of steel, as one would unwind ribbon from a spool, shaping the metal to a thousand purposes — to an accuracy within a few ten-thousandths of an inch.

CARBOLOY — a modern tool material developed by General Electric research — has made possible this speed, this precision. It cuts materials hitherto unworkable — cuts faster and holds its edge longer than steel tools — can be run at red heat without losing its temper.

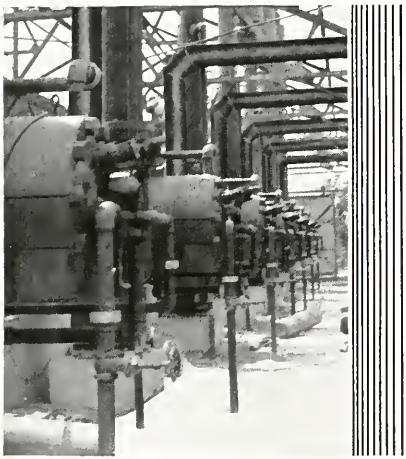
CARBOLOY is only one of the contributions made to improved industrial processes by G-E research — research that has saved the public from ten to one hundred dollars for every dollar earned for General Electric.

96-188DH

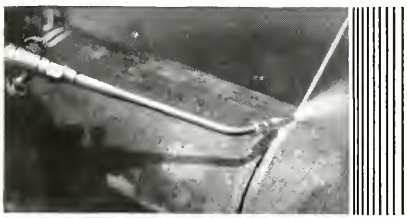
GENERAL ELECTRIC



This Lindewelded pipe can be buried and forgotten



Lindewelding also can be done on vertical and overhead lines



The Multi-Flame Lindeweld Head in action

80-MILE PIPING SYSTEM FOR GASOLINE PLANT *Lindewelded**

● The construction of an East Texas gasoline plant required approximately 80 miles of welded pipe. The piping system included gathering lines from over 1000 wells. It involved straight line runs, headers, bull-plugs, bends, angles and other specials. Pipe size ranged from 3-in. to 26-in. diameter—5/32-in. to 7/16-in. wall.

The Lindeweld method of oxy-acetylene welding was selected for this project after competitive tests with other types of pipe joints. The company found Lindewelding produced dependably uniform results, cost less, and could be done in less time.

The entire system was tested under pressure. Many of the welding operators had not used Lindewelding previously. Yet the company's engineers reported they did not find a single defective weld.

Lindewelding was brought to this project as a part of Linde Process Service, which is regularly available to Linde Customers—without charge. Linde Offices will gladly give you complete details on Lindewelding. They are located in Atlanta—Baltimore, Birmingham, Boston, Buffalo, Butte—Chicago, Cleveland—Dallas, Denver, Detroit—El Paso—Houston—Indianapolis—Kansas City—Los Angeles—Memphis, Milwaukee, Minneapolis—New Orleans, New York—Philadelphia, Phoenix, Pittsburgh, Portland, Ore.—St. Louis, Salt Lake City, San Francisco, Seattle, Spokane and Tulsa. The Linde Air Products Company, Unit of Union Carbide and Carbon Corporation.

*Lindewelding is a new method of oxy-acetylene welding developed by the Linde engineering and research organizations. This method requires less oxygen, less acetylene and less welding rod. Welds can be completed in less time. Yet Lindewelding involves only a special flame adjustment and a "back-hand" technique, together with Oxweld No. 24 Lindeweld Process Welding Rod. When circumstances permit, the Multi-Flame Lindeweld Head can be used. This will further increase the speed of Lindewelding. It costs only $7.75. On pipe line construction Lindewelding is consistently saving 15 to 40 per cent in welding time, rods and gases.

Everything for Oxy-Acetylene Welding and Cutting

LINDE OXYGEN • PREST-O-LITE ACETYLENE • OXWELD APPARATUS AND SUPPLIES FROM UCC LINDE UNION CARBIDE

PRODUCTS OF UNITS OF UNION CARBIDE AND CARBON CORPORATION

—AS I WAS THINKING—

"WATER," said the professor of hydraulics, stroking a meditative beard, "seeks its own level." Promptly a certain native skepticism asserts itself and "*I hae ma doots.*" In Yellowstone Park I saw water give the professor the Bronx cheer and prove that his whiskers are more mental than facial. Water may not seek its own level, especially if it be imbued with a little pep and push, if a small part of it decides to be steam.

I've been thinking that we engineers, as a profession, are perhaps a bit too ready to seek our own level, or possibly the level that older and more snooty professions think should be ours. Such a thought is prompted, in a measure at least, by the following circumstance. During the past summer there was organized in Chicago the University Broadcasting Council, which will sponsor radio programs of educational and cultural values. Professors of English will review books and plays, professors of economics will discuss government finances in astronomical terms, and those who profess the dubious science of politics will attempt still newer deals from the same old deck.

But I've heard no proposal that engineers should take part in such programs. Is there nothing that our profession can contribute towards such a movement, nothing that we can offer that the thinking minority would find interesting and of cultural value? I'll wager a tax token against a bootleg potato that many engineers, faced with such questions, would express doubt about the ability of the engineer to fit into such a picture. But I'm convinced that he can and that he should. We need more pep and push, more will to make our calling a genuine profession. To this end let us try to inject a little steam into the waters of our placidity.

JAMES C. PEEBLES, '04.

ARMOUR ENGINEER *and ALUMNUS*

Volume I | October-November, 1935 | Number 1

IN THIS ISSUE

Published in the interests of the students, the college, and the alumni of Armour Institute of Technology, under the direction of a Managing Board, consisting of: H. P. Dutton, Treasurer; W. Hendricks, Editor; H. Milleville, '36, Comptroller; D. P. Moreton, Chairman and Advertising Manager; H. Nachman, '36, Editor, at 3300 Federal Street, Chicago.


"SKYRIDE TOWER
BARKER-GOLDMAN-LUBIN COMPANY
WRECKING CONTRACTORS
A CENTURY OF PROGRESS
5:32 A.M., JUNE 8, 1935"

DESTRUCTION OF A CITY

By Harry Nachman, '36

IT WAS a cold February morning, and to the men who had just entered the silent grounds of the Chicago 1934 World's Fair the wind from Lake Michigan must have been matched by a chilly feeling inside.

During the next seven months it was their project to raze the three miles of built-up area before them and turn it back to the City of Chicago as good as new. This, the largest wrecking job ever attempted, offered a real challenge to engineering ingenuity and business organization and has been made a spectacular success by the wrecking contractors.

Cutting a Beam

It is interesting to consider some of the problems which confronted the wreckers. No two wrecking jobs are alike. There is no set rule or precedent from which to work, and a Century of Progress offered technical difficulties of especial uniqueness such as the 628-foot Skyride towers. In organization, too, the job was unusual. To check, superintend, and pay an army of 550 employes spread over a strip of land three miles in length takes a foreman with intelligence, initiative, and a fast car, and a clerical force besides.

Then, too, in order to make a profit the company had an initial expense to overcome. In their contract with A Century of Progress Corporation, the company reversed the usual procedure. Instead of being paid to do the work, the wreckers agreed to pay A Century of Progress a flat sum for the privilege of demolishing the Fair and selling the salvaged material. One of the partners, an expert in appraisal, had made a preliminary survey of the grounds and estimated the expense and returns involved in the project. A cubic foot of concrete was given a certain "minus" value as requiring effort to demolish but being unfit for sale as salvage. A board foot of lumber or a hundred pounds of structural steel were appraised at a certain "plus" value as salvage material. A summation of all the pluses and minuses (in the grounds) gave an estimate of the job and determined the bid.

Offices were erected, the Travel and Transport Building was mobilized as a warehouse, the Home Planning group became a garage, and the work of demolition began. Material salvaged was, for the most part, structural steel, metal siding and decking from the exterior of buildings, plaster board which walled most of the exhibits, plate glass, and lumber. The company brought its equipment to the extent of three cranes, several boom trucks for dismantling steel work, a stiff-legged derrick for loading steel onto the boats which came into the Fair lagoon for that purpose, an air compressor for the pneumatic hammer used in cleaning structural members, an acetylene generator, a saw for the hastily devised lumber yard, and a shear on wheels for cutting scrap steel into manageable sizes.

Even the routine wrecking work is of interest to the lay observer. The building is stripped carefully to the steelwork. Then the iron worker, skilled laborers, take charge. They swing up to the beams on the rope of the boom truck—and when they work on the top beams that swing amounts to a hundred feet or more—fix the rope around the beam and cut through the section at its supports. All cutting on this job was done with oxy-acetylene torches. The operator of the boom truck then maneuvers the beam to earth, and the ground crew takes charge. The beam is cleaned, that is, the rivet heads are removed with a pneumatic hammer and then the shanks are knocked out with a clean

Dropping the Beam

hammer. Meanwhile the now useless column which supported the dismantled beam is cut through at its base, ready to be lifted down by the boom truck.

From this point a sub-contractor takes up the work. The wrecking company smashed the concrete foundation to a depth of four feet below

ground level, carts away the debris, and resurfaces the ground, thus finally obliterating the last sign of the demolished building.

After a short time the office force was called into work, for orders began to pour in from all parts of the country for salvage. The quantity of material sold averaged between $3,000 and $4,000 every day, with daily expense varying from $1,400 to $2,100. It became obvious that the job was to net a profit unless an accident brought about a major unforeseen

Corner of the Lumber Yard

expense. And with this fact in mind, the wreckers of the Fair advanced to the climax in engineering skill and in danger, the destruction of the Skyride towers.

The west tower was near Soldier Field and the Outer Drive, and if it were to fall in the wrong direction and wreck the stadium or block the road, the expenses incurred would be enormous. Two weeks of preliminary work preceded the felling of the structure. An interesting part of this job was the tightening of the cables which helped support the gondola apparatus at the 200 foot mark of the 628 foot giant. With considerable looseness in these cables it was obvious that the natural tightening which would precede their snapping as the tower fell would react in a dangerous whip which could lead to considerable damage. Counterweights were therefore jacked up hydraulically to give slack; and then a turnbuckle arrangement at the point at attachment took up the slack.

The tower was to fall east, so the anchor bolts on the west legs were burnt, and then, two hours before the demolition, the east legs were burnt through. The tower was dynamited by charges in beds scored in the foundation, and fell in exactly the direction predicted although the east legs "walked" as it was falling because of the tremendous stresses developed in the structure. A tractor had been stationed a quarter of a mile away with a rope and pulley arrangement attached to the top of the tower. If the immense structure wavered after the explosion, the tractor was to start it down with a pull in the right direction, but it was not called upon. Because the proximity of the roadway, the tower was thrown in the very early morning when the minimum number of spectators would chance by.

The other tower was felled in a more perfect manner and was made a public spectacle. Thermit, a mixture of powdered aluminum and an oxide of iron which reaches a temperature of 1500° F. in fifteen seconds after ignition, was divided into four 750 pound charges in firebrick-lined cupolas built two each on the north legs. Ignition was arranged in series so in case of a fault in the line no accident could happen to cause the burning of only one leg and thus make the tower fall in the wrong direction. The chemical burnt ten foot sections away from each leg, and the great tower made an unforgettable sight as it fell gracefully to its destruction. The structural steel workers had opposed the throwing of the towers. They wanted to dismantle them, a project which would have cost a fortune in time, effort, and, incidentally, insurance rates which were a major expense in the entire job. The success of the means employed conciliated their objections.

The crisis of the destruction having passed, the wreckers could set about a survey of what had been accomplished. They had disposed of the following salvage:

Structural steel	11,500 tons
*Special nailer joists	1,100 tons
Metal siding and decking	500,000 sq. ft.
Lumber	3,000,000 ft.
Plaster board	2,500,000 sq. ft.

Phrases of Wrecking

Considerable work was done on the grounds before these materials were sold. The steel was cut into mill sizes as were the lumber and plaster board. The sawdust of the lumber was sold as salvage, while the scrap of the latter was sold for fertilizer.

What the city makes of the former Fair grounds after September 30 is no concern of the wrecking company. It has made a successful job, satisfactory job, satisfactory to all parties of the biggest wrecking job in history.

*A special member used in the Fair. The wood strips for nailing the light structure to the beam is part of the joist itself, thus making a lightweight, non-bulky, and fireproof member. They were sold to out-of-town buyers, since Chicago building codes do not approve them for permanent structures.

A MESSAGE FROM PRESIDENT HOTCHKISS

Armour Engineer is held in high esteem in the field of college journalism; there is every reason to be proud of it. The question with which its governing board is now occupied is, how best to build upon this enviable record so as to hold fast past achievements and increase the usefulness of *The Armour Engineer and Alumnus* for everyone who has the interest of Armour at heart.

One of the important services which *The Engineer and Alumnus* may render is to help turn the latent interest of alumni and friends into actual participating interest in the achievements of Armour graduates, in the many-sided activities of students, faculty, and trustees, and in the progress and visions for the future, all of which are the honorable heritage from a distinguished past. In this way, *The Engineer and Alumnus* can serve the alumni, and in so doing, serve Armour Institute of Technology. It can promote an effective cooperation in the activities of today and in the plans and aspirations for tomorrow. So in adding the word *Alumnus* to its title and striking out into new fields, *The Engineer* is not forsaking its past but instead is using that past as a foundation upon which to build the kind of literary organ which the conditions of the present require.

Journalism, in all professional fields, has to strike a reasonable compromise between appeal to the specialist and appeal to, what might be called, the general public of the profession. Except in the case of admittedly technical journals, whose market is strictly limited, articles that have to do with technical problems in particular branches of the field, in order to be effective, must be couched in language which at least the general practitioner, if not the layman, can understand and enjoy. No error is more fatal to good journalism than to assume that high professional standards and simple English are incompatible.

Obviously, a magazine addressed primarily to the alumni and students of a College of Engineering should not exclude articles that have to do with engineering achievement, but there is little place in such a journal for articles that cannot reasonably be presumed to interest any intelligent friend of the College, and the whole student and alumni body. More and more, our greatest specialists in engineering and science are finding it advantageous to tell the public about their achievements and their aims. Many of these scientists are masters of the art of simple but accurate and scientific expression. Engineering achievements are rich in material for fascinating journalistic exposition.

In trying to widen its appeal, *The Engineer* need, in no sense, compromise its standards as a purveyor of engineering contributions, but it can supplement these standards by setting equally high standards of journalistic exposition, and it can add new features through which it may hope to reach a larger public, and so increase its usefulness and safeguard its place in the Armour picture.

By giving increased attention to items of current interest to alumni and students, *The Engineer* will be performing an essential and indispensable function of college journalism. If the Board can organize its work in such a way as to present in well written, dignified but interesting style, stories covering those manifold enterprises of the students, the faculty, and the trustees, which have an inherent interest for everyone who is interested in Armour, there can be little doubt of its success. However, the very fact that these interests cover so many fields of endeavor and offer such rich materials for journalistic effort, means that the task which is being undertaken is a heavy one. It will require a high degree of competence, diligence, and sound organization, as well as ability to write, to perform the task adequately.

The Institute authorities will give the editors and managers of *The Armour Engineer and Alumnus* every possible encouragement in their endeavors, and will do everything in their power to help insure the success of the laudable undertaking upon which the board of managers is launched.

TO THE ALUMNI

John J. Schommer

THE ALUMNI of Armour Institute of Technology have survived a terrific depression. But in spite of the panic, we collected some money, paid out some, and we have some left. We have had some splendid banquets and good times despite the small collection of dues.

Your alumni organization has forty-one officers and advisers, and their help has constantly aided your organization. We now have many alumni trustees on the Board of Trustees of Armour Institute of Technology. At the next election, in June, we will elect three more. We now have a personnel officer on the staff whose duty it is to aid our graduates and former students of "Tech" to obtain jobs. We have started and we will continue to publish a real alumni magazine issued jointly by the association and the undergraduates. We now have chapters at New York, Milwaukee, St. Louis, Detroit and Cincinnati. During the height of the panic, the alumni pledged some sixty thousand dollars for the promotional fund and in the 1926 drive pledged about $350,000. We have about five thousand dollars in use for student loans.

The foregoing speaks of progress and service. Let us unite for greater progress and service. We have banded together for our mutual benefit and for the benefit of our Alma Mater—so says our constitution. Let us boost ourselves and Armour Tech. Let us set our faces forward. "He who looks back, dies of remorse."

Announcement

THE ARMOUR TECH ALUMNI ASSOCIATION

takes pleasure in sending you this copy of our new magazine. It will come to you four times a year. This will be possible through the co-operation of the student body, the college, and the alumni.

All we ask of you is your interest in our new undertaking. This means first of all that we must have your correct address. Next, we need some information about you—what you are doing, where you have been, when you were married, and how many children you have. If you have any news about any other alumnus, or a missing address, we should like to have that too. Needless to say we need long articles of general interest; and we can get out a bigger and better periodical with the assistance of advertisements.

Last of all, we should like to know what you think about us; that is, your reactions to the contents of the magazine. Letters, in the form of brickbats and bouquets, will be presented in subsequent issues.

Managing Board.

ENGINEERING AND ENGINEERING EDUCATION

By A. A. Potter
Dean of Engineering, Purdue University

OUR times are distinctive, because of the introduction of science and engineering in the everyday affairs of everyday people. Whether civilized man likes it or not, he is destined to live and to work in an environment affected to an increasing extent by science and technology. While some blame the engineer for the sufferings of our times, the fact is that scientists and engineers should be credited with the delivery of humanity from the so-called Malthusian doom. Whereas in the past civilizations man had difficulty in producing enough to maintain himself above the level of mere existence, the engineer, by applying science to practical uses, assures an abundance of the world's goods for all, given only an effective system of exchange. Depressions are not due to a lack of material wealth to satisfy human needs, but to our inability to distribute it rationally. However, our present problems, serious though they be, should be easier to solve than those resulting from scarcity and want.

Also, it should be recognized that while the work of the engineer in improving methods of production has reduced employment in some specific cases, the engineer is primarily a creator of both wealth and of opportunities. By proper application of science he has created, during the past 65 years, where nothing was before, such giant industries as those which manufacture automobiles, typewriters, radios, talking machines, airplanes, telephones, refrigerators, etc., as well as new utilities which are concerned with electric communication, electric transportation, and electric light and power. These are creations, not merely developments. These have not displaced labor, but have added in the past new opportunities for profitable employment and happy careers for millions of people. It is reasonable to expect the engineer to develop new industries in the future as he has in the past, creating new opportunities, new jobs, and new careers.

In thinking of the future of the engineering profession, it is well to keep in mind the fact that the world is as far from finished today as it was 75 years ago when the U. S. Commissioner of the Patent Office handed in his resignation to the President of the United States of America because he felt that everything worthwhile had been invented. . . . The engineer has barely started in his work to provide better and easier ways of satisfying human needs. He has much to do in bringing about more general well being and higher standards of living for all.

The demands upon the engineering colleges of this country are bound to grow to satisfy the need for purely technological talent as well as for individuals with an engineering background to deal with the distribution and adaptation of the products of industry. To an increasing extent the executive and administrative posts of industries, utilities, and public works are also being filled by technically trained engineers. Furthermore, the undergraduate engineering college curriculum, concentrated on underlying fundamentals, is rapidly becoming an accepted form of modern collegiate education, as it acquaints the student with the processes, devices and methods which make our civilization distinctive. Cultured people are those who understand their environment—the world in which they live—and no type of education so directly assists the individual to understand his surroundings as engineering education.

As to trends in engineering education:

Engineering of a century ago was mainly an art. Thus engineering colleges during the earlier years of their existence stressed manual dexterity; they were concerned more with training for the acquirement of skill rather than with education in basic principles; they placed major emphasis upon studies which led to usefulness immediately after graduation and not upon general educational values. Developments in transportation, mechanical power, communication, illumination, chemical technology, mining, metallurgy, manufactured gas, central heating, mechanical refrigeration, and other new industries and public utilities have resulted in a demand for special educational preparation. Engineering colleges attempted to meet these new requirements by setting up numerous specialized engineering curricula.

During the past thirty years there has been a definite trend away from the purely utilitarian and specialized in engineering education. The engineering colleges have given up the idea of trying to train in a four year undergraduate curriculum specialists for the various fields of application. The best of these institutions have been tightening up their entrance requirements, and have been concentrating upon subjects which are basic and which the student has difficulty in acquiring by his own efforts. While the scope and range of the engineering field has been constantly broadening, increased emphasis is now being placed by engineering teachers upon fundamentals; completeness of details is being subordinated to thoroughness. The providing of a background of engineering knowledge is not being considered so important as development of ability to reason logically and to arrive at truth by observa-

(*Turn to page* 28)

MEET OUR TRUSTEES

GEORGE S. ALLISON, treasurer of the Institute, needs no introduction. His whole life has been identified with Armour interests. As a young man he was a member of the famous Armour cadets; and he was closely connected with the old Mission. In 1910 he was appointed registrar of the college; and he has served successively as comptroller, secretary, and treasurer, filling each position with characteristic industry and efficiency.

Stern as he may appear to some, he has a fine sense of humor. He is also a lover of play. He enjoys swinging a golf club, and likes to sit down with members of the faculty or with friends to a game of bridge. He was also observed during the world series taking time out to listen in on the games.

Aside from his connections with the Institute, Mr. Allison has been active in the College and University Business Officers Association, having served as president; and he is chairman of the Educational Division of the Ways and Means Committee of the Chicago Association of Commerce. He has also been active in fraternal affairs, has filled the highest offices, and in turn, has frequently been honored by them.

ALFRED S. ALSCHULER, a distinguished architect, was born in Chicago. He studied architecture at the Art Institute and at Armour Institute of Technology, graduating in 1899. Later Armour conferred upon him the honorary degree of Master of Arts. He began his architectural work in 1899 with Dankmar Adler, and continued from 1900 to 1903 with Trent and Adler. In 1903 he became a member of the firm of Trent and Alschuler; and since 1907 he has been at the head of the firm that bears his name.

Mr. Alschuler has specialized in commercial and industrial buildings, having designed anad constructed a large number in Chicago and elsewhere. He received a gold medal for the plan and design of the London Guaranty and Accident Building and an honorable mention for the Lake-Michigan building. Other office structures of his include the Westminster, Cunard, Utilities, Chicago Mercantile Exchange, and Finchley's; in- and Finchley's; industrial plants include Brach, Sexton, Thompson, Chicago Mail Order, Dick, American Radiator, Standard Sanitary, Kuppenheimer, and Florsheim. He was the first architect to use reinforced concrete in Chicago. Many of the large department stores in and around Chicago have been erected by him. He has also invented improvements in construction and devised many new features for industrial buildings.

LESTER ARMOUR was born in Chicago in 1895. He attended St. Mark's School, Southborough, Mass., and Yale University. After graduating from Yale, in 1917, he went into Naval Aviation, serving during the war and receiving the commission of Ensign.

In 1919 Mr. Armour entered the employ of Armour & Company, and in 1926 was made Vice President. In 1930 he resigned from this position. He is now Chairman of the Board of The General Stockyards Corporation, Director of Rathbone, Hair, & Ridgway, Armour & Company, and various Stock Yards companies.

PHILIP D. ARMOUR was born in Chicago in 1893. He preceded his brother Lester at St. Mark's School and at Yale University. In 1914 he entered the employ of Armour & Company as a clerk to learn the business, and was later appointed Vice President, a position he resigned in 1931. As indicating his interest in civic affairs, it should be noted that Mr. Armour is General Chairman of the Community Fund.

CLAIRE L. BARNES grew up in the small town of Comstock, Michigan, and after graduating from the high school went through Kalamazoo College by attending evening classes. In the office of the treasurer of the American Radiator Company he learned the financial end of business; and voluntarily shifting to the shops he learned the practical side of manufacturing as assistant to the plant superintendent. He helped organize Detroit Steel Products, acted as secretary and sales manager for three years, and learned how to build up sales. He gained further contact with production through experience as assistant to John N. Willys of Willys-Overland. In 1916 he organized the Barnes Foundry and Manufacturing Company; but because of the war this company was liquidated.

Mr. Barnes is now president of the Houdaille-Hershey Corporation, formed as a merger of Hershey, Houdaille, and Oakes Products corporations. These properties are decentralized and act as units, in the manner of General Motors. Their products, which include shock absorbers, locks, fans, carriers, and other equipment, are sold to automobile manufacturers.

VINCENT BENDIX, president of the Bendix Aviation Corporation, was born in Moline, Illinois, in 1881. At the age of sixteen he went to New York City. His first job was that of elevator operator in a Manhattan hospital. He contemplated a career as an attorney, but soon after arriving in New York, the youngster became convinced that his interests lay in the invention and production of mechanical devices.

Completing his studies in 1907, Mr. Bendix returned to Chicago and became sales manager of the Holsman Automobile Company. The following year he produced an automobile bearing his own name. These pioneer motor vehicles, with their difficult hand-crank starting systems, recognized two vital needs of the automotive field. The first was that the future success of the "horseless carriage" depended a great deal upon the ease with which the motors could be started. Recognizing the need, he produced a connecting "link" between a starting motor and the flywheel of the motor car's engine. It was called the "Bendix Drive."

From the day the Bendix Drive became a reality, the progress of the automobile industry received a great stimulus. Today more than 35,000,000 of these starter-drives have eliminated the use of the hand-crank on as many automobiles.

It next became apparent to Mr. Bendix that automobiles were in dire need of positive stopping devices. The Bendix four-wheel braking principles were introduced and popularized in America. Through recent acquisitions and affiliations, Mr. Bendix now manufactures mechanical, air, hydraulic, and vacuum brakes, brake boosters and brake testers for automobiles, and double-disc landing wheels and brakes for airplanes.

Having perfected devices for starting and stopping automobiles and airplanes, Mr. Bendix interested himself in equipment that would keep these vehicles going. His organization acquired the Stromberg Motor Devices Company, now the Bendix-Stromberg Carburetor Company. Subsequently other prominent automotive and aviation accessory concerns were acquired.

Today Bendix Aviation Corporation is recognized as one of the foremost manufacturers of automotive and aviation equipment in the world, with fifteen immense plants in this country and abroad. In fact, so numerous and so popular are Bendix products that every square foot of soil traversed by auto-

motive vehicles, every expanse of water navigated by motor-driven boats, and all ethereal spaces pierced by the airplane testify to the safety and convenience that Vincent Bendix has contributed to modern travel.

Besides his business interests, Mr. Bendix has taken an active hand in social and civic affairs in both America and Sweden. He was recently honored with a knighthood by King Gustav of Sweden, who conferred upon him the insignia of the Order of the North Star. He is the donor of the Golden Pavilion at the Century of Progress exposition, and donor of the collection of East Asiatic ecclesiastic art exhibited in the Liljevalch Hall of Art in Stockholm. He has been awarded the Linné medal by Sweden.

JAMES D. CUNNINGHAM, President of the Board of Trustees, was born in Chicago in 1887. Upon graduating from the Hyde Park high school he went to work as a clerk in the Armour Glue Works. From 1909 to 1911 he was a member of the firm of Clyde Machine Works Company. In 1911, at the age of twenty-four, he founded the Steam Appliance Company, now the Republic Flow Meters Company, of which he is president. He is also president of the Autogas Corporation and the Smoot Engineering Corporation, director of the Illinois Manufacturers Association, of the Lumbermen's Mutual Casualty Company, of the Association of Arts and Industries, and of the Western Society of Engineers. He is a former president of the Illinois Manufacturers Association and former vice-president of the American Society of Mechanical Engineers. He was chairman of the Rehabilitation Committee, Seventh District, during the Hoover administration, and Industrial member, Chicago Regional Labor Board during the tenure of the NRA. He is now vice-chairman of the Chicago Community Fund, 1935.

HOMER H. COOPER was dubious about replying to our request, declaring that he had no photograph and very little biography; but he did supply us with a "few notes for an obituary."

I was born in Chicago, Illinois, (where my mother happened to be at the time) on September 18, 1887. My father and mother were English, living in Champain County, where my father was engaged in farming. Later we removed to Shelbyville, Illinois, where I attended grade and high schools. In 1904 I entered the University of Illinois as a student in electrical engineering. At the end of the first year, the Dean of that school had me on the green carpet. He said: "Cooper, I have looked over your grades for your first year in engineering. I find that in courses such as language, rhetoric, and the like you are at the head of your classes, but in analytical geometry, descriptive geometry, trigonometry, and shop work, you are just barely skimming through. I am inclined to think you are going to find engineering too hard for you. Why don't you study law?"

After turning over the Dean's question at the age of sixteen years, I at last decided not to try to be an electrical engineer. My credits were transferred to the College of Liberal Arts, and I had two years of work at that school. Then I dropped out in 1906 and for six years was in the newspaper business in Mattoon, Illinois, serving as reporter, city editor, circulation manager and, finally, just plain manager, of a daily newspaper there. In 1912 I took up the study of law at Northwestern University Law School, and in 1914 received a degree of LL.B. I entered the employ of Hamlin & Topliff in 1914, but from October, 1917, until March, 1919, was in the army. I had the commission of Captain of Infantry, but on October 7, 1917, was detailed to the Provost Marshal's Department, and had supervision of the Selective Service work (you would call it the draft) in Northeastern Illinois. As a swivel chair officer, my work was interesting, arduous, but never dangerous. On March 1, 1919, I became a member of the law firm by which I had been employed, and it became Hamlin, Topliff & Cooper. That partnership lasted until September 1, 1930, when it was dissolved and I became a partner in the firm of Scott, MacLeish & Falk.

I have been married once and still have one wife. She was born Myrtle Falcon. We live in Evanston, and have two dogs. I think I belong to the Presbyterian Church, but am probably in arrears on dues. My hobby is not working, though I reluctantly admit I have not yet had enough idle time to devote myself to that hobby. I am unique in that I have not read "Anthony Adverse" and do not play golf.

If you must have a picture, I can give you a kodak print of myself on a horse, taken this past Summer out in Montana. It is my favorite likeness, but probably would not add prestige to the Armour Engineer and Alumnus or any other publication short of the Police Gazette.

HOMER H. COOPER.

PAUL H. DAVIS, stock broker, investment securities, was born in Crawfordsville, in 1889. In 1907 he graduated from the Hyde Park high school and in 1911 from the University of Chicago.

He worked in the bond department of the Colonial Trust and Savings Bank, 1911-1912; and with John Burnham & Company, 1912-16. Since 1916 he has been the senior partner in Paul H. Davis & Company, which holds a membership in the New York and Chicago stock exchanges and in the Chicago Board of Trade.

Mr. Davis is a director of the Bendix Aviation Corporation, Borg-Warner Corporation, Evans Products Company, Houdaille-Hershey Corporation, and the Noblitt-Sparks Industries, Inc. From 1931-33 he was president of the Chicago Stock Exchange, and he is a governor of the New York Stock Exchange and of the Chicago Stock Exchange. His "hobbies" are hunting, fishing, and amateur radio.

LAWRENCE A. DOWNS went to work for the Illinois Central Railroad in 1896 as rodman in the Engineering Department and was elected president in 1926. In the thirty years intervening he was successively assistant engineer, roadmaster, assistant engineer maintenance of way, division superintendent, general superintendent and assistant general manager of the Illinois Central and vice-president and general manager and president of the Central of Georgia Railway, owned by the Illinois Central.

In addition to being president and director of various companies comprising the present Illinois Central System, Mr. Downs is director of the Association of American Railroads, chairman of the Southeastern Presidents' Conference and director of the Railway Express Agency. He is also trustee of the Mutual Life Insurance Company of New York and director of the Continental Illinois National Bank & Trust Company of Chicago.

Mr. Downs has numerous interests in the educational field. His own school is Purdue University, from which he graduated in engineering in 1894. He holds the honorary degree of Doctor of Engineering conferred by Purdue in 1929 and the honorary degree of Doctor of Laws conferred by Centenary College (Shreveport, La.) in 1931. A member of the Research Council of Purdue University, member of the Administration Council of Loyola University (Chicago), and member of the Board of Governors of International House at the University of Chicago. He is a charter member and past president of the American Railway Engineering Association. Mr. Downs has taken a prominent part in the affairs of Sigma Chi fraternity and at present is a member of the national executive committee of that fraternity. He is president of the Indiana Society of Chicago.

Mr. Downs is a loyal churchman, and in 1931 he was made a Knight of Malta by His Holiness, Pope Pius XI.

Ed. Note: This series will be continued in subsequent issues.

Do not throw away bound or unbound copies of technical journals or transactions of learned societies. Send them, with any other books or materials, to the Institute library. If duplicates, they may frequently be exchanged for other valuable additions. Contributions to the library will be gratefully accepted.

FROM THE DEAN'S OFFICE

ARMOUR INSTITUTE of Technology has been educating young men for the professions of engineering and architecture for forty-three years, and many sons of former graduates are now entering each fall. These young men find the outward appearance of the school much the same as their fathers found it; they find some of the same professors, and they find that their course includes the same rigorous discipline that has been a fundamental part of the institution since its inception. However, many important changes have been made in curriculum and in educational methods. The fundamentals of engineering and architecture are much the same today as they were twenty-five years ago, but continuous developments in science and technology, as well as changes in the social and economic structure, have necessitated numerous adjustments in educational procedure. The curriculum in an up-to-date school of engineering must be revised from year to year to keep pace with new developments. New laboratory equipment must be constantly added and the school must maintain close contact with the industries which are to absorb its graduates. All of these things combine to make the education of the engineer of 1935 quite a different process from the experience of the graduate of 1910.

The new *Armour Engineer and Alumnus* provides a long needed means of contact between the school and its ever increasing number of graduates. Alumni of Armour Institute of Technology have made generous contributions to the welfare of the institution, but have never before been provided with a regular medium for the dissemination of news about the school or their classmates. I sincerely hope that these pages will provide the vehicle for maintaining close contacts between the school and all its former students and for keeping alive many of those worth-while associations formed during college days.

The new *Engineer* should serve to encourage interest on the part of those graduates who would otherwise find it difficult to keep in touch with the school. While serving as the joint publication of the alumni, the students, and the school, this new magazine enjoys a tremendous opportunity for advancing their common aims. I welcome particularly the opportunity thus provided to present to the alumni body a true picture of new developments in the educational structure of the school. Without this information, an alumnus can scarcely feel competent to discuss his Alma Mater with a prospective student, or to pass judgment on the strength of its educational program. A very large proportion of the new students entering Armour each year

do so on the recommendation of alumni and former students. This accumulated goodwill is one of the greatest factors in maintaining a high standard in the student body by attracting the proper type of applicants. The information contained in later issues of this magazine will prove particularly helpful in assisting graduates properly to interpret the school to young men interested in securing a thorough education in engineering and in architecture.

Later articles will provide a discussion of the important changes in technical education which have taken place at Armour in the past few years. These will include not only a description of developments in the four-year undergraduate curriculum but also an account of the post-graduate courses and the enlarged evening school program.

H. T. HEALD.

ACTIVITY IN RADIO AT ARMOUR

During the fall of 1933 a group of freshman students organized the Armour Tech Radio Club. It had among its purposes the organization of radio amateurs at the Institute, the acquainting of other radio amateurs with the Institute by means of a short wave amateur station, and the promotion of an interest in radio among the students. Permanent headquarters have been established at 3329 Federal St.

The activity of chief interest to most members is the radio station. After having been assigned the call signal W9YW by the Government, we went on the air in the fall of 1934. The transmitter has been operated in the twenty meter band on a frequency of 14,260 kc. The use of this wave length during the day has made it possible to contact all radio districts in the United States and several foreign countries. Since there are now thirteen licensed radio operators among the membership, it has become necessary to work out a schedule of station operation. The Armour Tech Radio Club is desirous at this time of exchanging and relaying radiograms and news dispatches with other colleges and educational institutions throughout the world.

To see the **right**, and **not do it** is cowardice.
—Confucius.

Associate reverently, and as much as you can, with your loftiest thoughts.
—Thoreau.

A TALE OF TWO UNIVERSITIES

By E. U. Schrupp, '35

MY YEAR of study at Armour, leading to a degree of B. S. in mechanical engineering, has followed my complete engineering education in republican Germany, and has revealed the contrast in educational methods in the Old World and the New. The actual need of my year's work in America was the learning of the different system of notation, but I have been able to observe a great deal more than this.

The science of engineering is existent throughout the world, so the actual material which is taught in German universities may not contrast more with any American school than do the curricula of other American schools. It is the method of administering the knowledge that is fundamentally different. In my observations I have never attempted to draw comparisons. Let some one else analyze them.

Higher education in Germany is for the "upper classes," or, in short, for those who can afford it. Rare is the case in which a man works his way through the university, a feat quite common in America. The German engineering student may be in school until his twenty-eighth or twenty-ninth year, and his family must be in position to support him during all this time.

The first years of the boy's education are those to which the children of every German citizen are entitled. They correspond roughly with grammar school training in the United States, but the student who plans to continue his education takes only four years of this elementary work. He then enters a parallel to your high schools and spends nine years in furthering his education. Here he absorbs a higher learning than American high schools provide, and with it a "culture" or poise, which distinguishes him from those who have not had his schooling. The product which emerges from these thirteen years of education is a pretty well-polished individual, and yet it is only the cream of these graduates who go on to the university.

There are several engineering colleges in Germany, but before the student starts his training at any one of them he has had to complete a very important part of his education. His secondary school studies have been aimed along scientific routes, and after graduation he enters the greatest scientific laboratory, the actual manufacturing plant. He is accepted without question as a student employee and proceeds to learn the basic trades of engineering. He may spend three months as a machinist, three more as a pattern-maker, or designer, or electrician, or in any one of the posts in which a novice can become acquainted with the fundamentals of engineering.

He may spend one or two years in the shop as seem necessary in his particular case. He is paid for his work, but the amount is not a living wage. It is more like a receipt for labor, and does not relieve the family of the student's support during this time.

After his shop experience the German youth is ready for college. He is now about the age of the average college graduate in the United States, with four years of education remaining. But these four years are productive of a much more advanced learning than the undergraduate in America is availed. And why should this be so?

The answer is easy: Two years of practical experience make the fundamental engineering studies very simple. The instruction in machine design does not include the painstaking explanation of details. The student has seen the part in action and knows what it looks like and how it is used. And he has worked from blueprints, so his civil courses do not have to include long sessions in layout. This obviating of details in the early courses of study makes time for advanced work in later college years. And it is not without results. Almost every university graduate to be found in Germany has a responsible, executive position.

As for life in college, this, too, differs greatly from that in the United States. A German feels that his university years are the most perfect of his life, for, since the college man must be well-to-do, he has no worries, and can combine his adult intellect with the care-free life of a child.

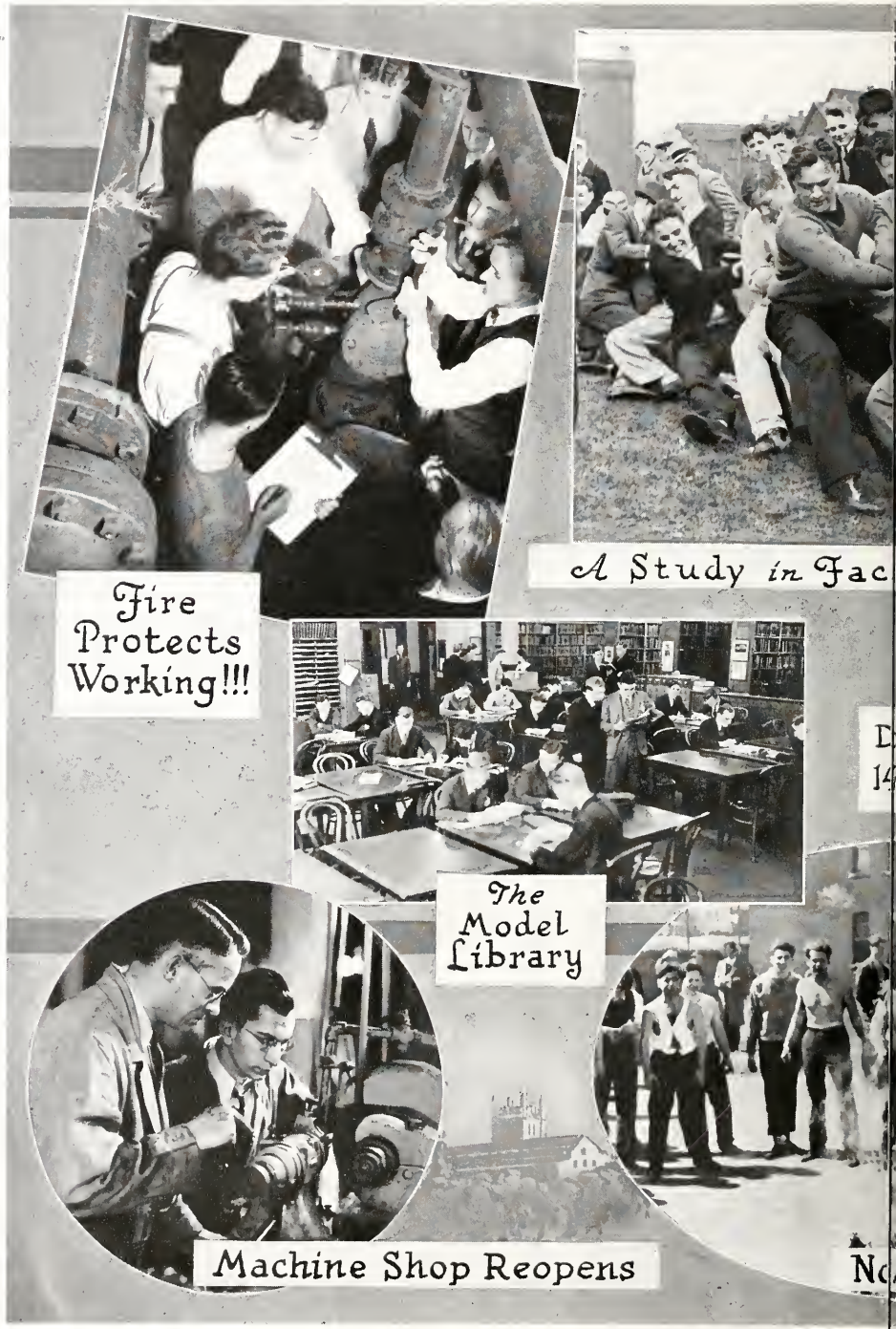
Fraternities are a powerful factor in college life, or were until the present government opened a campaign against secret organizations. This was living! Anyone could join a fraternity, but once in it he was part of an organization with ancient traditions and binding ties, an organization whose undergraduate members wore their fraternal uniform and went out socially in a body; and the alumni made sure that the new graduate was not in want of a job. It is hard to set down in words the rich life which was that of the fraternity man.

Of intramural and interscholastic activity there is none. The sports calendar consists mainly of duelling, there being duelling and non-duelling fraternities. The only competitive action is when two of the former have occasional friendly, but often bloody, matches.

But there are studies, too. Attendance at classes is not compulsory at any time after registration. The student attends his lectures and takes notes as he sees fit, but the very rigorous pre-college weeding

(*Turn to page* 28)

RANDOM SHOTS



ABOUT THE CAMPUS

COLLEGE CHRONICLE

THE FRATERNITIES

AFTER the turmoil of Rush Week the houses turned to other activities for a bit of relaxation. . . . The Phi Kaps held their eighty-fifth annual Founders Day Banquet at the Interfraternity Club on October 19. . . . The same week-end several Delts journeyed to Urbana to enjoy the Illinois chapter's annual Pledge Dance held on the eighteenth. . . . The officers of the Triangle House spent a few days at Purdue about a month ago attending the chapter school held there. . . . Those T. N.'s attending the biennial convention in New York City returned to school none the worse for the wear and tear and the general good time they enjoyed there. . . . As much can be said for the two senior Delts attending the Karnea in Memphis. . . . The Phi Pi delegate to their convention at Cleveland also attended the air races held in that city.

The Pi Kappa Phi's enjoyed the hard times party sponsored by their Chicago Alumni Senate on October 26. . . . At their first smoker the Rho Delts had a one hundred percent attendance of last year's graduates. . . . Interfraternity basketball is on deck and attracting a great deal of attention from all quarters. It has been seventeen straight for Phi Pi. . . . Pledge Dances are the order of the day with Phi Pi and S. A. M., both holding theirs on November 2. The Phi Pi Phi affair took place at the house, while S. A. M. held theirs at the home of one of the members. . . . The Delts are much interested in their Pledge Dance which is coming off on November 30. . . . Triangle is already anticipating their Christmas Dance which will be held in conjunction with the Northwestern chapter. . . . Alumni Smokers still flourish up and down the street. Pi Kappa Phi, S. A. M., and the Phi Kaps each have one scheduled for the month of November. . . . The Interfraternity Council is undecided on the date of the coming Ball. They are discussing the relative merits of the Thanksgiving and Christmas seasons. This means that the Ball will probably be held in April. . . . Incidentally the boys at all the houses find a few odd moments for study.

ATHLETICS

IN just a few weeks the basketball season will be under way. A rather formidable schedule has been arranged for the team. The schedule is as follows:

Dec. 5—Arkansas State at Armour.

Dec. 11—George Williams at Armour.

Dec. 14—North Central at Naperville.

Dec. 17—Wheaton at Armour.

Dec. 21—U. of C. at Chicago.

Jan. 11—George Williams at George Williams.

Jan. 16—Wheaton at Wheaton.

Jan. 18—Lake Forest at Lake Forest.

Jan. 20—Michigan State Normal at Armour.

Feb. 8—Michigan State Normal at Ypsilanti.

Feb. 10—Detroit U. at Detroit.

Feb. 14—Carroll at Armour.

Feb. 19—Lake Forest at Armour.

Feb. 22—Carroll at Waukesha.

Despite the new freshmen ruling, the prospects for the team are rather good. The old problem of student support of athletics has been with us to the present. We hope that it will be eliminated this year. The six home games will be played at the 108th Engineer's Armory, 3401 South Wentworth Avenue.

AND THE NEW MEN

There are a large number of freshmen who look very promising as potential athletes. Because of the freshmen ruling placed in effect this year they will not be eligible for varsity competition this season. However, big things are expected of them next year.

Louis Lougullo is an upper classman coming here from Chicago Christian College. At Christian, Louis playing forward, captained the basketball team for two years. He also was editor of the school news publication and won his letter in baseball. Louis attended Tilden High School where he was prominent in athletic activities. We hope he will come through with just as good a record at Armour.

* * *

Paul Henriksen of Austin High School should prove a valuable addition to the basketball team next year. While at Austin Paul was able to earn three letters in basketball. For the past two years each spring he has busied himself with the duties of baseball manager.

* * *

Should our non-existent football team desire some material among the freshmen, it might seek out Ralph Tullgren. Ralph is a graduate of Fenger High School where he earned two letters in football playing end and halfback. He also earned two letters in wrestling which means that there is another competitor for the title in the 165 pound class.

* * *

Fred Hippchen earned two letters playing end on St. Michael High School's football team. He was also placed on the all-Catholic eleven. After football season was over Fred took an interest in basketball, enough interest, in fact, to earn four letters in that sport. Being a versatile person he alternated playing both forward and guard. While he spent a great deal of time with athletics, Fred also found a little time for studying. Scholastically he ranked number one man in his graduating class.

ENGINEERING PROGRESS

TWO MILLION PATENTS

In 1836, one year short of a century ago, the United States Patent Office started the present series with number one. On April 30, 1935, patent number 2,000,000 was granted for a pneumatic tire for railroad cars, the title, "A Vehicle Tire," oddly enough being the same as that of number 1,000,000.

Patent 1,000,000 was issued in 1910, so that the first million were granted in 74 years while the next million patents required only 25. Interesting also is the statement in that patent of 25 years ago that the tire presented was to replace the pneumatic tires then in use.

The first patent of the United States was issued in 1790 for a process of making pearl and potash. This grant was signed by President Washington and countersigned by four of his five cabinet members. In that year there were three patents issued, and by 1836 there were 9,957.

At that time, a commissioner of patents in charge of a patent office was appointed and a new series was started with number 1.

Covering the various inventions which helped to build America, the collection of models which were formerly required in applying for a patent shows the rise of agricultural implements such as the McCormick reaper, followed by the development of the railroads, and extending to the modern ideas in steel, rubber, and airplanes.

HARDENING MACHINE PARTS

The reduction of time required for hardening crankshafts or gear teeth is found in a method simpler than either the case-hardening or nitriding process. Instead of requiring days or hours, several minutes will suffice to harden journals of shafts.

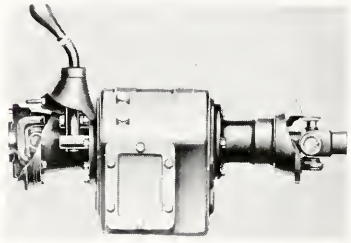
The popularity of the Diesel engine in Germany is responsible for the perfection of this process which gives the necessary hardness and greatly lengthens the life of journals and bearings. Records have been kept of over 200,000 shafts, all showing exceptional service.

The heating of the shafts or gear teeth is done locally by a torch, the temperature of which is checked by a pyrometer. When sufficiently heated, the parts are quickly quenched by a special machine. They are then annealed to 200° C. for several hours after quenching to improve the structure of the hardened metal.

Since no chemicals are added, the hardening elements come from the steel, so that it is necessary to use the proper allow in the process. With chrome-molydenum steels, costs are claimed not to be excessive, while the rapidity of the process makes it readily adapted to production.

NEW GEAR RATIO UNIT

Designed to replace the present transmission in late model Ford or Chevrolet trucks, a new unit gives twelve speeds forward and three reverse. From the wide range of ratios, there is one to serve almost any demand of the driver for maximum power or speed. There are four compound gears with a high-high for either fast travel at usual engine speed or for regular road time with the engine running twenty per cent slower, with less wear and less gasoline and oil consumption. It combines in one unit the standard ratios, the "underdrive" and the "overdrive."



GOLD IN THE SEA

The pirate loot which is buried in the sea would be well worth having. The San Francisco meeting of the American Chemical Society found quite an argument in progress about the hope of finding the gold of the sea. Only, being chemists, they say that just as there is salt in the sea, so must a certain amount of gold be dissolved in the ocean.

Incredible though it seems, these scientific gentlemen propose pumping the ocean through their special filter—and thus extracting the precious gold which has been accumulating there since time began. The idea is not untried, for, a plant on the Atlantic coast has for the last two years been pumping as much of the Atlantic ocean as possible through its processing treatment to extract bromine. Last year 15,344,290 pounds of bromine was used, an increase of 51% over the year before, due mainly to this new source. Bromine finds its most important use in the making of "ethyl" for gasoline; gold has a number of uses, so if there is any hope, the attempt will be made.

The main drawback seems to be the question of just how much gold there really is in the sea. Five thousand analyses made by the famous Professor Fritz Haber and associates in the hope of using the gold to put Germany on its feet, found from 5 to 10 parts per billion. A method was proposed to work on this basis, even though it meant pumping one or two tons of water to get one cent's worth of gold. Although this has never been carried out, it is still an interesting problem especially since the value of gold has gone up since that time. The most novel suggestion of all is the latest proposal, to electroplate the gold out of solution upon the propellors of ships as they churn across the ocean.

NEW STEAM GENERATOR

Diesel power, which seemed to be overtaking steam in one field after another, has been threatened by a radically new steam generator. Instead of trying to go the field one better with a larger boiler, some European designers have tested more than twenty small units of a new type having phenomenal properties.

This new steam generator uses gas or oil, fired under pressure with compressed air to give combustion and flue gas velocities in excess of that of sound. This unit, strangely enough, gives a transfer of heat far greater than that predicted by theory. The discharged gases from the combustion chamber and superheater are utilized to run a small turbine which then operates a compressor to maintain the fuel pressure.

Operating with a very small amount of water in the boiler and having no brickwork, the boiler and generator can be started in five minutes. Rapid fluctuations in steam consumption are not dangerous; there is no danger of a blowoff if the steam is suddenly cut off.

The small size of the units makes them useful anywhere, while their light weight—one-fifth that of a corresponding water tube boiler makes them desirable for warships, especially the narrow destroyers. Here, too, the invisible flue gases resulting from complete combustion are an advantage.

In the field of steam locomotion the greatest hope is held, for a boiler can be made of far greater power without adding excess weight. In a locomotive, it is predicted that the new boilers will easily give 2,400 pounds pressure and a speed of 100 miles per hour.

WHICH SCHOOL IS BEST?

Which engineering school is best? That often argued question about the standing of different schools is at last to be definitely answered.

The accrediting is to be done by the Engineers' Council for Professional Development, an organization sponsored by the leading national engineering societies, such as the A. S. C. E., A. I. M. M. E., A. S. M. E., A. I. E. E. and A. I. Ch. E.; the engineering educators in the S. P. E. E. and the National Council of State Boards of Engineering Examiners.

Limiting itself at first to New England and the Middle Atlantic States, the Council will consider the curricula of schools interested in the plan. The method, when it has been checked in these sections, will be extended to other parts of the country.

Placing quality of work above statistics, the Engineers' Council will make a large amount of useful information available. Primarily it will aid engineers in obtaining state licenses, since state boards allow work at an accredited school to count as partial fulfillment of their requirements. And, finally, the answer may be found as to just how good the old school is.

NON-EXPLOSIVE GASOLINE

The fire hazard of aviation promises to be almost eliminated by a solid gasoline recently subjected to engine tests at the Guggenheim School of Aeronautics of New York University. "Dry" and non-explosive, the new form of gasoline may be burned slowly, like a stick of wood, while one end is held in the hand.

A jelly-like substance, it is soft enough to be kneaded like a piece of art gum. When used in engines it passes directly from the solid to a gaseous form without passing through the liquid state. This, furthermore, enables the engine to be run without a carburetor.

The solidification process which is claimed to add little to the cost of the gasoline is also applicable to fuel and lubricating oils. This means not only greater safety and lower costs in transportation and handling, but provides a new method of lubrication for journal boxes and other heavy bearings.

STEEL CLEANED

The rapid cleaning of steel which is to be painted or otherwise finished was recently demonstrated by an economical electrical process. A display by a utility company used strips of steel which had been covered with a layer of baked enamel over a baked primer to show the rapidity with which the pieces carried on a conveyor could be stripped of any surface covering to expose the clean steel.

Suspended from a copper bus bar, the parts were immersed in a caustic solution and subjected to an alternating current of ten cycle frequency at two and one-half volts. Without the electric current, the cleaning was very slow, but when the current was applied, gas was evolved at the steel surface which rapidly became bright.

Economy is claimed for the method and since it is so rapid, conveyors may be used to make it a continuous process.

NON-WILTING COLLARS

Next to a collar button which is guaranteed not to roll under the dresser, men have long wanted a non-wilting collar. To the chemical engineers, then, goes the credit for making the first shirt collars which will always hold their shape without ever being starched.

Cellulose esters, such as the acetate, long used as artificial silk, are the binding materials which fuse the layers of cloth to the collar. While first tried with a band of this material, later tests showed the advantage of using only separated threads.

Heat and a solvent complete the welding process in which the artificial silk first becomes viscous so that it sticks to the cloth fibers. Then, when the solvent is driven off in heating, the fused layers of cloth remain. A soft collar, though stronger and waterproof, is not abrasive and retains its shape without starching.

RESOURCEFULNESS—THE KEYNOTE OF THE ENGINEER'S AND ARCHITECT'S SUCCESS

By Wm. N. Setterberg, Arch. '29
Placement Officer

"Resourcefulness in difficulties is the distinction of great generals." Thus, we may speak of the architectural and engineering graduates who have so successfully shown their ability to weather the storm of the recent economic readjustment. These men, with their normal fields of endeavor seriously demoralized, have made excellent use of their broad training in exploiting other fields outside of pure engineering to such an extent that more and more people are led to believe that an engineering or architectural education is equal to that offered in any other field. Recent studies by the American Telephone & Telegraph Company and the General Electric Company substantiate this.

It has long been thought that a technical man is trained primarily as an instrument or tool for the use of the civilized world as a creator of machines and buildings, and not as one who could assist in their application. Because of such a mistaken judgment, this world has missed much in its development of social progress. Needless to say, we have advanced very rapidly during the last fifty years in our technical progress; but man is still mired in the social quicksands of the past. As he has been called upon to administer to the outward needs of civilization, so will the technical man be called upon to assist in guiding the people through the fog of ignorance of technological application.

The engineer's and architect's liberal education has taught them to be conservative. It has also taught them to face facts; for without them there can be no grounds for the development of any problem of importance. Naturally, they may develop an instrument or process which may appear to be out of the ordinary to the public; yet behind it all remains the fundamental reasoning of fact.

Through this ability to weigh one fact against another, the engineer has been called upon to act in many capacities completely outside the normal fields of engineering and architecture. Such activities include in addition to invention, research, design, and manufacture, many other important capacities in the operation of this productive and progressive civilization.

Our doubts are traitors, and make us lose the good we oft might win by fearing to attempt.

—Shakespeare.

To have what we want is riches; but to be able to do without is power.

—George MacDonald.

THE BOOK SHELF

AIR CONDITIONING AND OZONE FACTS

By W. Riesbeck
The Goodheart-Wilson Co., Chicago, 1931

One of the most thorough of the great number of books regarding air-conditioning which have recently appeared is in this volume by Mr. Riesbeck.

The subject matter is arranged in such a manner that the book might almost be regarded as a general handbook of air-conditioning. Written in non-technical language, it is doubly easy to understand, and doubly helpful.

In the field of air-conditioning, the principal consideration is that the installation must give satisfactory and economical results. This aspect is especially stressed not only in regard to air-conditioning, but also its related fields, such as refrigeration, cold storage plant operation, use of ozone, and sterilization of water.

A chapter is devoted to a discussion of some of the common troubles encountered in air-conditioning installations and methods of avoiding or correcting them.

Methods of figuring fan capacity are presented, accompanied by tables, as are the other parts of the book, drawn up from practical experience and research.

The last portion is taken up by a study of the practical applications of ozone, chief among which is the purification of water supplies.

ALLOYS OF IRON AND TUNGSTEN

By J. L. Gregg
McGraw-Hill, 1934

The present volume is the third in the Alloys of Iron Research Monograph series, the first, "The Alloys of Iron and Molybdenum," having been published in 1932, and the second, "The Alloys of Iron and Silicon," in 1933.

Like its predecessors the book is a concise but comprehensive critical summary of research in one branch of the wide field of ferrous alloys.

Written with the help and supervision of a body of metallurgists gathered from the foremost industrial corporations, the monograph naturally stresses the research attitude. Much heretofore unpublished matter pertaining to special phases of the subject is therefore presented.

The technology of tungsten alloy manufacture is discussed in the initial portion of the book, while the remainder is taken up by data on various high-speed steels. A very pleasing feature is the summary by the author at the end of each chapter. Graphs, tables and photo-micrographs accompany the text.

WHO'S WHO

CLARENCE W. FARRIER, born in Tipton, Iowa, graduated from Armour in 1916 with the B.S. degree in Architecture, and in 1917, he married Miss Edna Mahon of Chicago, and they now have a son, John Marshall Farrier, age eleven.

During the World War Lt. Farrier held many responsible organizational positions. After his discharge from the army he secured a position as an engineering draftsman with the City of Chicago, and in a few months he was promoted to the position of City Planning Engineer.

Under his leadership such projects as the Michigan Avenue Bridge and Viaduct, the Wacker Drive Widening and Structure, the Ogden Avenue Extension, etc., were executed. During this period Mr. Farrier also served the Chicago Zoning Commission and was instrumental in making a physical survey of every piece of property, every building, and every factory in the city. This survey was the basis for the new Zoning Ordinance.

From 1924 to 1929, while he was associated with Bennett, Parsons & Frost, Consulting Architects, and City Planners of Chicago, he completed many more noteworthy projects such as the George Rogers Clark Memorial and the Clarence Buckingham Memorial Fountain.

In October, 1929, he became part of the organization of a Century of Progress, and in his capacity as Assistant Director of Works oversaw all design and construction work on the buildings in the Fair grounds. Mr. Farrier is the person who designed the famous hanging dome of the Travel and Transport Building. Before the opening of the Century of Progress in 1933, Mr. Farrier was made Assistant Director of Operations. Under his direction, the guide force, the fire department, and other organizational aids were formed, while he also put finishing touches on isolated pylons, designed the Avenue of Flags, etc. During the winter he became Assistant to the General Manager and had charge of all special events in the following year's Exposition.

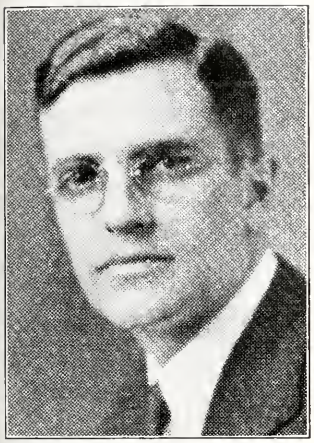
At the close of the Fair, Mr. Farrier was appointed coordinator of the Development Organizations of the Tennessee Valley Authority and went to Knoxville, Tennessee. In this important department, under Mr. Farrier's supervision, investigations in engineering, forestry, soil erosion, transportation, power, industry, agriculture, and social and economic problems will be conducted.

Portsmouth, Ohio, July 19, 1935.

I thank you for this opportunity to tell what I am doing at the present time for the benefit of my past fellows who may be surprised to find out.

Although a member of the class of '21, I did not get my B.S. in Chem. Eng. until '24, owing to some time out during the war in 1918. Since then I spent one year as Chemist and Engineer in different fields in and about Los Angeles. While Efficiency Engineer for a Natural Gas Co. in Los Angeles, I felt called to Christian work and left the Chem. Eng. field for Bible Engineering. I attended school some six years after that getting my Th.B. and Th.M. degrees. Since 1929 I have been located here at Portsmouth as pastor of the Central Presbyterian Church with a membership of 432 and a Sunday School of five hundred. I have

been serving two CCC camps as Civilian Chaplain for about a year, and since May I have been on active duty with the CCC as Army Chaplain, in addition to my other duties. I am serving seven



camps with fifteen hundred men and some twenty-five regular officers.

I am sure Prof. Sherger will be glad to hear this report. I don't know if any of the other Armour men have turned their efforts into this field or not, but for me it has been the avenue of my greatest service.

My short enginering experience has been a help to me in my present work by way of meeting practical men in a practical way and gaining their confidence for God and for good. If I can be of service to Dear Old Armour call on me, and if it is in my power and ability I will be on the job.

Sincerely,

G. H. Vorsheim, Jr.

We are of the opinion that the depression didn't affect GEORGE A. KLOEPFER, a C.E. of the class of 1920, very much, since he now holds two important positions. He is now on active duty with the U. S. Navy at the Naval Reserve Aviation Base, Great Lakes, Illinois. His work consists principally in training students to fly. This work is in connection with the training of prospective Naval Reserve Officers, and, in all probability, will last for a period of at least two years. His other achievement is that of last April 16, when he was elected Police Magistrate of the Village of Arlington Heights for a term of four years.

He is married and the proud father of two children, a boy five years old, and a girl two years old.

His hobbies are amateur telescope making and the writing of aviation articles for whoever may accept them for publication. Perhaps (with a little coaxing) he will submit an article for publication in the Armour Engineer and Alumnus concerning his aeronautical experiences.

ALUMNI NOTES

1897

RALPH H. RICE is on the Board of Supervisors and in charge of engineering for the Chicago Traction Co. He has written numerous articles both for the A.I.E.E. and the W.E.S., from which he received the Octave Chanute medal in 1910.

1898

We wonder if the present East African situation reminds E. H. NAGELSTOCK of his career in the war against Spain. We hope to have some of the details of those exploits for a later issue.

1899

W. J. GORDON did not send his son to Armour for his degree in mechanical engineering. The junior member followed in his father's footsteps, but at the University of Minnesota where he received his diploma in June.

E. V. STARKWEATHER, now a grandfather, is superintendent of the Improved Risk department at the Royal Insurance Co., New York.

1901

F. A. LINDBERG finds his work as Chief Engineer at Armour & Company demanding of various interests. He is a member of the A.S.M.E., A.I.E.E., and W.S.E.

1902

R. G. REINIGER is a veteran Pacific Coast man. Seattle is the home town of the Reiniger family, which is doubtlessly pulling for Jimmy Phelan's football heroes these fall afternoons.

1903

Although J. E. LANNING received his degree in electrical engineering, most of his work in Clarkdale, Arizona, is in the mechanical field.

1904

M. R. NYMAN, who was a member of the world's championship water-polo team in 1907, is now manager of the Occidental Life Insurance Company in San Francisco, where he is also state director of the Izzak Walton League.

1905

R. H. ROBINSON has had great distinction in lodge work. He is a Past Master in the Masonic Lodge and a past president in the Lions' Club. His home, you know, is in Ontario, Cal.

1906

From Miles City, Montana, comes word from H. J. SAWTELL. In reply to our question on books, articles, etc., the gentleman says, "I raise cattle, but don't write books."

1907

L. B. JONES is president of the United Warehouse Company in Kansas.

1909

We'd like it, too! M. J. ANDERSON reports that in winter, when he wearies of his work with the Indiana and Michigan Electric Company, he enjoys his fishing off the Florida coast.

When J. E. MEGAHY finishes a day's work at the City Hall, he begins office hours as a physician on Chicago's South Side.

1910

I. N. BAUGHMAN, M. E., deserted his thermodynamics to take up gentleman farming at Marseilles, Illinois, finding enough time, though, to be mayor for the last four years.

1911

HARRY N. PARSONS is Chief Engineer of the Ball and Roller Bearing Division of the International Harvester Company. He holds a number of patents in this field, and is a member of the Standards committee of the Society of Automotive Engineers. His son is a senior mechanical at A.I.T.

1912

Vivian, Louisiana, is the town in which a new lubricating oil refinery is a monument to the engineering ability of its builder, O. R. ERICKSON.

J. E. RUEF will soon celebrate his twentieth year as industrial sales engineer with the Peoples Gas Light and Coke Company, Chicago. His hobby is music, the oboe being his speciality.

1913

D. W. HAMILTON, president of the school board in Flossmoor, Illinois, is going in for farming, a fact to which his fine herd of Jersey cows will attest.

1914

Stop in at the Hotel Peabody next time you are in Memphis, Tennessee. Its manager—ARTHUR F. SCHOEMBS.

1915

Twenty years of railroad maintenance and valuation work ended for Max Dietenbeck last March. At last word he was seeking a new connection which, we hope, he will be soon able to make. His address is 214 W. Lincoln Avenue, Wheaton, Illinois.

1916

G. F. Wetzel is teaching at Lane Tech High School in Chicago while doing consulting work in air conditioning. *Power Plant Engineering* will shortly carry a series of his articles.

1917

C. R. Pomeroy is designing and building a triple action power press. The baby weighs 750,000 pounds and is 42.5 feet tall.

1918

S. C. Hulburt is in a practical side of architecture. He is a merchant tailor in Freeport, Illinois.

1919

M. F. Bacon manages the local branch of the Household Paper Products in Fort Wayne, Indiana.

1920

A. L. Lyon received his certificate as Master Brewer in 1933, from the Wahl Henius Institute and is now with the Northwestern Malt and Grain Company.

1921

R. E. Poplett is a ten-year Rotarian. He was president of the Maywood, Illinois, club in 1930-31.

1922

Frank Nurczyk is manager of the Polish-American Business Men's Association.

1923

Laurence G. Miller is working as a cost engineer with the Super-Power Company of Illinois, the organization which built the State Line generating station, and is now erecting another large power plant near Peoria.

1924

Leslie L. Swartz is out to prevent accidents. Working with the Chicago Surface Lines, he makes statistical records and analyses of accidents to show how they may be prevented.

1925

W. E. Schweitzer is in real estate work in Chicago. An article written by him appeared in a recent journal in that field.

1926

Donald S. Ullock, after studying chemical engineering at the University of Michigan for the past two years, received his doctor's degree and is now with the Carbide and Carbon Chemicals Corporation at South Charleston, West Virginia.

1927

Kenneth E. Crane reports that he is out of the architectural profession and is now operating a chain of stores in Wisconsin.

1928

Maybe you can blame some of this modernistic furniture on T. E. Samuelson. Conducting his own architectural office in Chicago, he says that he has designed modern furniture and cabinets for several manufacturers, and in 1933 exhibited in the International Modern Exhibition.

G. W. Kleinert has been engaged in foreign patent and trade mark practice for seven years. His membership in Eta Kappa Nu, honorary electrical, and Delta Theta Phi, honorary legal fraternity, attest to his varied interests.

1929

Not satisfied with just plain television, J. H. Hromada, E. E., is working with the Bureau of Air Commerce in Washington in adapting the idea to airplanes. As an associate radio engineer he is doing development work with ultra-high frequencies, for use in facsimile and teletype operation.

Did you see Kieth Misegades' picture in the papers last March? It seems that he was snapped buying some of Mr. Farley's special stamps. In addition, though of lesser importance, he was admitted to the U. S. Supreme Court in June, his business address being the U. S. Patent Office.

George Rezac claims to be the only Armour man working on the Norris Dam in Tennessee. As an engineer in concrete pouring, he says the work is good—only he has to climb a few thousand feet of ladders every day.

1930

John W. Hurley is again a pilot, now with the United Airlines in Chicago. He had been teaching at Lane Tech High School, but before that he graduated from the U. S. Navy flying school, and was with the famous "High Hat" squadron on the U. S. S. Saratoga.

HERBERT E. STIER may be neglecting his juice, but look what a field he has taken up. His business is in the scientific end of criminology as a firearms identification expert in Chicago.

1931

WALTER E. SCHIRMER, E.P.E., has turned to law and is registered to practice in the United States Patent Office in patent, trade mark, and copyright law. He reports also that he will be admitted to the Illinois bar this fall.

CHARLES WYANT, C.E., with the U. S. Engineering Office in Chicago, also wants to be a lawyer. Now in his third year of law school, he also belongs to Delta Theta Phi, the honorary legal fraternity.

When rolling along Chicago's Outer Drive, take a look at the tall apartment building at 5000 Cornell Avenue. It is managed by A. A. EHRLICH.

1932

Another juicer who went astray is G. L. BONVALLET. Not only is he teaching mathematics, but he is also the bandmaster at Plainfield high school in Plainfield, Illinois.

DONALD BRAUN, Arch., found teaching air conditioning to be interesting enough to warrant the taking of some courses in education at the University of Chicago last year. A high school substitute, he has evening classes, using his own air conditioning text at Englewood evening school.

EDMUND FIELD is in the chemistry department at Northwestern University. He reports that he was elected to Sigma XI, research honorary fraternity, and holds a fellowship in chemistry for this year.

JAMES S. MCCALL started teaching mathematics in high school after graduating from Armour, but he has, for the past two years, been in the engineering department of the Pullman Standard Car Manufacturing Company, where he specializes in air conditioning.

Maybe VIRGIL MINNICK is too bashful to mention it, so his classmate, HERBERT W. RICHTER, another electrical, writes that Virgil was married on Columbus Day. Herb is with the International Business Machine Corporation in Chicago.

G. J. Stockman, Ch.E., who took his master's degree at Armour, is now designing equipment for Wurster and Sanger, Inc., in Chicago.

1933

A number of the Century of Progress year graduates are already hooked. Married men include O. T. Barnett, R. W. Carlstrom, E. A. Dunham, M. J. Erisman, W. W. Lange, Jack Maclennan and V. P. Peterson. At latest report the Dunham's are the only couple started on a family.

1934

Strayed from the fold. Leo Frandzel is in Memphis, Tenn., W. C. Freitag is now addressed in Minneapolis as will be E. H. Shaw in a couple of days; T. C. Gault is in Janesville, Wis., and G. E. Myers now resides in Springfield, Ill.

ENGINEERING EDUCATION

(*Continued from page 9*)

tion and analysis. The time given to informational courses is being greatly reduced, and an effort is being made to awaken the creative instinct of the student and to stimulate independence of thought and self reliance. Specialization is being definitely discouraged for undergraduates, but is given a place in connection with research in the graduate programs of study which lead to the higher degrees.

Contrary to the general impression, undergraduate engineering instruction is not purely technical but has been planned so that the undergraduate student devotes about one-half of his time to science, mathematics, and the humanities. Nearly all engineering undergraduate curricula include required courses in English, history, and economics. In a number of engineering colleges the undergraduate program of study permits electives in psychology, sociology, accounting, personnel administration, business law, banking, corporation finance, and other courses which are helpful to the student in acquiring an understanding of social and economic problems. To an increasing extent engineering students are receiving instruction in industrial engineering and management. It is the general opinion, however, that extended business training should not take place in an engineering curriculum of basic instruction in science and technology.

Greater attention is given to economic and historic studies so that the engineer will have a better appreciation of the coordination of technology and economics as well as of the science of government which controls his affairs. During the past year several engineering colleges have announced special curricula as preparation for public service. The functions of government are becoming more and more technological in character, and to an increasing extent the engineer's activities are concerned with public works. It is most desirable that all engineers have a better appreciation of the relation of engineering to the public and to its agent—the government. All intelligent people must take an active interest in public questions, as only under a stable government can one make the best use of his talents.

The engineer of tomorrow must have a thorough scientific preparation if he is to make full use of the foundations laid by science. Science and technology are interdependent, and the future progress of one depends upon the other. There is a trend toward more thorough instruction in science and mathematics and for the general broadening of basic theory in engineering instruction. Quality rather than quantity is the guide in revising programs of study, as the superficial familiarity with many subjects is less valuable than the complete mastery of a few.

Until very recently the interest of engineering colleges has centered in undergraduate instruction, as industry and the engineering profession have given inadequate recognition to resident graduate study. However, during the past decade graduate or some other form of advanced study has become a necessity for the higher technological posts of industry. In several cases industries have perfected special arrangements with the educational institutions of their localities so that the engineering college graduate may complete requirements for higher degrees by pursuing advanced study while he is gaining industrial experience. Growth in graduate study has been particularly noticeable since 1930, as many of the unemployed have been striving to improve their education. Graduate study is now receiving definite encouragement at a number of engineering colleges as the preparation of their staffs has improved and as better research facilities have become available for the solution of new and advanced problems.

The engineering profession has taken in the past little active interest in shaping or in directing engineering education. What aid has been given to engineering education by engineers has been largely individual and unofficial and has not represented the concentrated thought or the united action of the engineering profession. It is gratifying, therefore, that the recently formed Engineers' Council for Professional Development, representing as it does the leading engineering societies has its program focused upon the educational preparation of the engineer. This Council has set as one of its main objectives definite encouragement for the further personal and professional development of the college graduate as a qualifying standard for certification into the engineering profession.

Engineering education is bound to grow in importance as a preparation for a career in technology and as an accepted form of modern collegiate education, and the contributions of the engineer to human welfare are destined to become greater and greater in the years ahead.

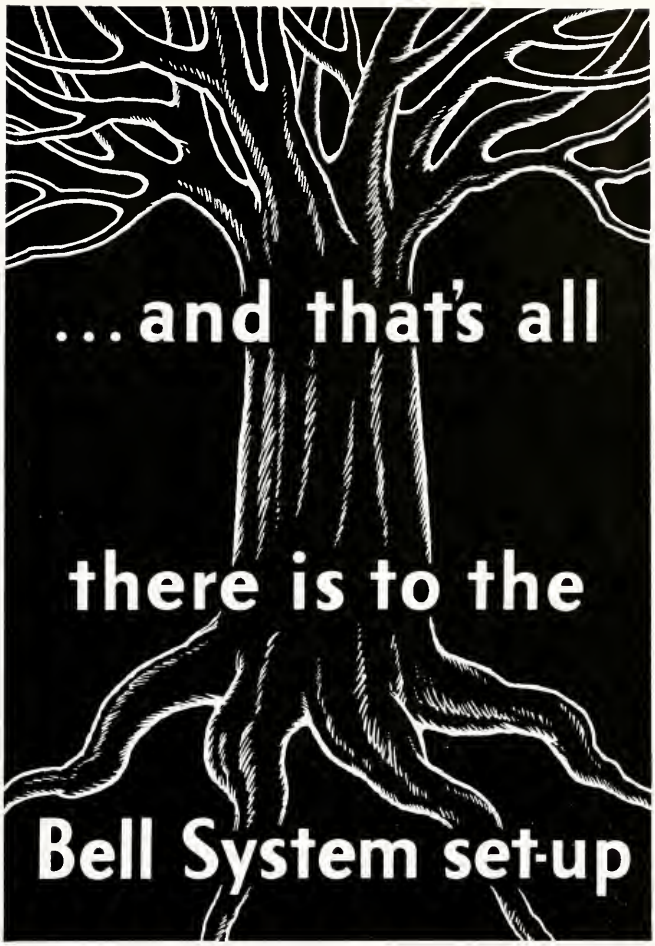
TWO UNIVERSITIES

(*Continued from page 15*)

out of students produces a type of scholar in the university who is anxious to be at the lectures and to keep a system of notes whose completeness often rivals a textbook on the subject. Examinations are held only at the completion of a course and are the criterion upon the basis of which the student passes or fails to pass. But the passing of the work is really left up to him entirely. His whole college life is absolutely a procedure of his own choosing in every detail.

In general, it seems that a German engineering college tends strongly to develop an individual, while an American institution has a tendency towards socializing him, leaving a great part of his self-education to his own post-graduate efforts.

BE TRUTHFUL
BE ACCURATE
We always weaken what we exaggerate.
—LaHarfe.



THOUGH large, the Bell System is simple in structure. You can think of it as a tree.

Branches: 24 associated operating companies, each of them attuned to the area it serves.

Trunk: The American Telephone and Telegraph Company, which coordinates all system activities.

Roots: Bell Telephone Laboratories and Western Electric, whose functions are scientific research and manufacture; Long Lines Department of A. T. and T., which through its country-wide network of wires links together the 24 operating companies, handles overseas service; Advisory Staff of A. T. and T., which advises the operating companies on all phases of telephone operation and searches constantly for better methods.

Working as one, these many Bell System units enable you to talk to almost anyone, anywhere, any time.

Why not call your folks tonight? For lowest rates, call by number after 7 P. M.

BELL TELEPHONE SYSTEM

SPORTS REVIEW

by John J. Schommer

There are many reasons and excuses for athletics at a college. One may run the gamut of reasons from stadia, fieldhouses, gymnasiums, golf grounds, publicity, a money-making project, etc. to the desire of affording every student some form of physical exercise for his health.

It was thought essential not so many years ago that a president of a college should be a minister because such a man would have a good influence on the morals of the student body. Now good morals and the desire for regular exercise, with many other valuable traits, are inculcated by gymnasiums.

The desire for regular exercise through some sort of physical endeavor is fulfilled by games, by a set drill of gymnastics, or both. The English speaking people desire the former; while Germany, until recent years, when she and many other nations took up our English sports, like football, baseball, track, tennis and golf, was the chief devotee of the latter.

It is my sincere desire, "when our ship comes in," to stress the games that one may play until the infirmities of old age prevent further participation: Not games for a few, but for every student whose heart and physical being pass a physician's test. Every student must learn to swim, play golf, tennis, squash racquet, and handball. After learning the rudiments of these physical endeavors as freshmen, they may go out for the teams in basketball, baseball, track, and other possible sports.

This program calls for facilities that Armour Tech does not have. But with what we do have and with the small amount of money available, there is much that is accomplished.

Mr. E. W. McGillivary, coach of the aquatic sports at The University of Chicago, is our swimming coach. Under his leadership and the use of the facilities at The University of Chicago, our students have developed a swimming team that enjoys competition with our sister colleges. There are about thirty men on the swimming squad.

Under the direction of Professor W. W. Colvert of our physics department, a tennis team has been developed. Professor Charles Tibbals was the former coach, who, with some brilliant players, defeated everything about the country for four years. He gave up this "racket" and Professor Colvert has ably taken up the leadership. Our courts were built by the Tech Athletic Association and are used by the general student body.

The golf team was, for years, coached by Charles Leigh of the mathematics department, and many excellent golfers have come and gone. On his retirement, Professor S. F. Bibb of the mathematics department, was given this task of developing a fit representation to compete with other colleges. I say task, for we must rely on the generosity of golf clubs, inadequate transportation, and lack of practice facilities. Bibb is doing a good job with these handicaps and with his small squad of ten to fifteen men.

Boxing and wrestling are taught by Mr. B. Weisman, who is an attorney at law. We have a regulation ring, and some seventy men are indulging in body pitching and face slapping. There are many bouts between students, and there are some intercollegiate contests, too. There are forty men on the wrestling squad and thirty men on the boxing squad.

The track team has been trained under Alonzo Stagg, Jr. Again the facilities of The University of Chicago were placed at our disposal. Our boys used the University's fieldhouse in the autumn and winter. Last year we lost "Lonnie Junior" and Norman Root is our new coach. There are about fifty men on the squad, and they have a number of meets throughout the year.

Basketball and baseball are coached by "Bill" Krafft. Basketball, due to our collar box gymnasium, is now played in the Wentworth Avenue Armory. Our schedule is about sixteen games, and about twenty-five men are on the squad. The last several years, the teams have been excellent. Baseball is still played at Ogden Field on one of the best diamonds in the West. In this sport, the old baseball tradition is still carried on. "Tech" always has a good ball club. The squad numbers about thirty men.

The last several years "Armour Tech" has been right up at the top in athletic endeavors. In fact, our boys have been so good that those who years ago used us for mere practice games have forced us, in order to find competition, to introduce the freshmen rule which prohibits us from using freshmen on the teams.

Besides these forms of exercise, the student body indulges in fencing and archery; and it has a rifle club that has won many medals. Matches are shot out by mail and telegraph communication with many distant colleges. Professor Mangold is sponsor for the rifle club.

Intramural sports also are indulged in. The student body has interfraternity competition in baseball, basketball, indoor ball, and track. Also, there is interclass competition and interdepartment games.

For a small college, inadequate facilities, and a meager amount of money, there is none that surpasses our athletic program.

Have you ever heard of our relay games? This circus of athletic events is held every year at The University of Chicago field house and has attracted teams from all over the country. Last year there were thirty-six colleges and universities in competition. But that is another story. Watch for it in the next issue.

the all purpose dipper!

1.
Tooth bases are cast integral with lip (no expense for renewing bases).

2..
Note the dovetail joint! Lips are quickly and easily changed by loosening two U-bolts and removing four wedges.

3...
The U-bolt fastening between lip and back supplements and reinforces the dovetail joint between lip and front.

4....
Back lugs can be arranged to fit any type of dipper stick. Dippers are made either with bail or without as required.

5.....
A renewable Manganese Steel wearing band compensates for wear at the dipper heel.

6.....
Furnished with double wall lip and teeth for hard digging and rock handling; single wall cutter type lip and teeth for rehandling, stock piling and loose material digging; and a thin, serrated edge, cutter type lip for mucking, clay digging, etc.

U. S. Patent No. 1,945,064

The AMSCO Renewable Lip All-Manganese Steel Dipper cuts digging costs. It consists of a one-piece cast manganese steel body available with easily renewable or interchangeable lips. Any type of lip can be supplied that is best adapted to digging conditions.

Lips are quickly and easily changed in the field—no trouble—no delay. Knock out four keys, loosen two U-bolts and the lip is off. No rivets to punch out or renew.

Get maximum efficiency and greater yardage from your shovels—equip them with AMSCO All-Manganese Steel Renewable Lip Dippers.

Your shovel manufacturer or our nearest office will gladly furnish complete details on these new AMSCO Renewable Lip Dippers which are made for all shovels in sizes from ¾ yard up and without separate lips in ⅜, ½ and ⅝ yard sizes.

Write for the facts today.

AMERICAN MANGANESE STEEL COMPANY

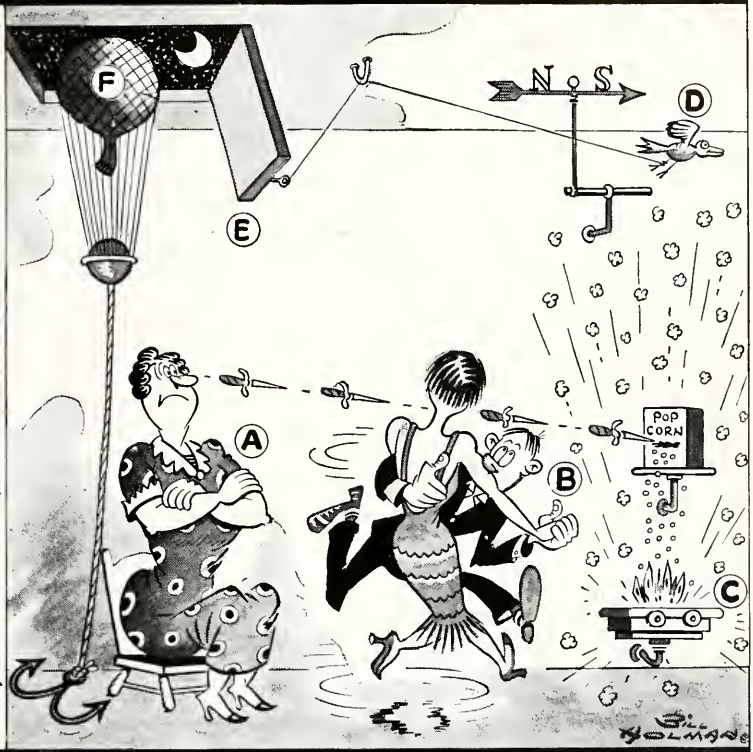
389 East 14th Street, Chicago Heights, Ill.

Division of American Brake Shoe and Foundry Co.

AMSCO

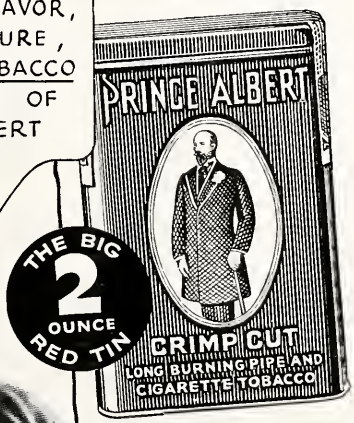
EASY WAY TO HANDLE A CHAPERON

CHAPERON (A) LOOKS DAGGERS AT STUDENT (B) DANCING WITH GIRL IN LOW – NECKED DRESS. STUDENT DUCKS DAGGERS WHICH STRIKE BOX OF POP CORN AND PIERCE HOLE IN BOX. POP CORN LEAKS OUT ON TO LIGHTED STOVE (C) AND IS IMMEDIATELY POPPED. BLUEBIRD (D) SEES POP CORN AND THINKS IT IS SNOW. STARTS TO FLY SOUTH WHICH RELEASES TRAPDOOR (E) AND ALLOWS LITTLE GIANT SUPERCHARGED STRATOSPHERE BALLOON (F) TO ESCAPE HOOKING CHAPERON AND TAKING HER UP FOR A BETTER VIEW OF THE MOON



... AND AN EASY WAY TO ENJOY A PIPE

I GET MORE FLAVOR, MORE PLEASURE, AND MORE TOBACCO IN EVERY TIN OF PRINCE ALBERT



SPECIAL PROCESS REMOVES "BITE"

PRINCE ALBERT'S EXTRA FLAVOR AND MILDNESS ARE DUE TO TOP-QUALITY TOBACCO, PLUS A SPECIAL PROCESS THAT REMOVES ALL "BITE" FROM THE TOBACCO. P.A. IS "CRIMP CUT"... COMES IN A BIG RED 2-OUNCE TIN. NO WONDER MORE MEN SMOKE P.A. THAN ANY OTHER SMOKING TOBACCO

PRINCE ALBERT
THE NATIONAL JOY SMOKE!

Chick Meehan's INSIDE TIPS ON WATCHING FOOTBALL

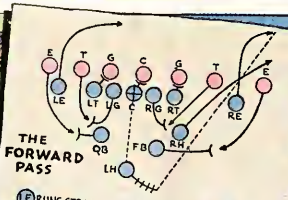
AT THE GAME, CAMELS EASE THE STRAIN – AND AFTER IT'S OVER, WHEN YOU FEEL "ALL IN", *GET A LIFT WITH A CAMEL!*

MR. MEEHAN, MY SISTER BETTY WANTS SOME INSIDE DOPE ON FOOTBALL!

SURE! COME UP IN THE STANDS AND WE'LL WATCH THIS PRACTICE GAME!

IT TOOK ELEVEN MEN TO MAKE THAT PASS PERFECT!

WHAT A PERFECT PASS THOSE TWO MEN MADE!



(LE) RUNS STRAIGHT, SWERVES TO RIGHT – (LT) BLOCKS GUARD – (LG) BLOCKS TACKLE – (C) BLOCKS C – (RG) BLOCKS TACKLE – (RT) BLOCKS GUARD – (RE) RUNS DOWN FIELD, SWERVES TO RIGHT – (RH) FAKES BLOCK, SWERVES TO RIGHT – (FB) BLOCKS END – (QB) BLOCKS FOR PASSER – (LH) FADES BACK AND SHOOTS PASS TO (RE) WHO IS SPRINTING TO RIGHT —

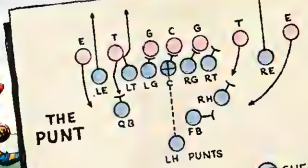
WHAT ACTUALLY HAPPENED

NOW – WATCH THIS PUNT FROM THE SAME FORMATION!

I DIDN'T KNOW EACH MAN HAD SUCH A DEFINITE JOB

BETTY SEES A BACK GET OFF A 60-YD. SPIRAL — AND

THIS IS HOW IT WAS DONE —



(LE) RUNS DOWN UNDER BALL – (LT) CHECKS TACKLE AND THEN RUNS DOWN UNDER BALL – (LG), (C), (RG), AND (RT) HOLD LINE – (RE) RUNS DOWN FAST UNDER PUNT – (RH) BLOCKS TACKLE – (FB) BLOCKS END – (QB) BLOCKS TACKLE OR END – GIVING (LH) TIME TO PUNT

WELL, BETTS, DID YOU LEARN SOMETHING?

REMEMBER, WATCH THE LINEMEN

DID I! I CAN'T WAIT TO SEE THE BIG GAME!

BETTY LEARNS THESE PLAYS – AND MANY OTHERS

YOU'RE AN EXPERT NOW, THANKS TO CHICK MEEHAN!

A SPLENDID RUN – BUT GOOD BLOCKING MADE IT POSSIBLE

BETTY AT THE BIG GAME

THAT GAME WAS A THRILLER! HAVE A CAMEL!

I NEED ONE! SO MANY THRILLS USE UP A LOT OF ENERGY!

A CAMEL ALWAYS RENEWS MY FLOW OF ENERGY WHEN I NEED IT — AND THEY NEVER GET ON MY NERVES

YES, THEY CERTAINLY ARE MILD!

CAMELS ARE MADE FROM FINER, MORE EXPENSIVE TOBACCOS – TURKISH AND DOMESTIC – THAN ANY OTHER POPULAR BRAND.

(SIGNED) R. J. REYNOLDS TOBACCO CO. WINSTON-SALEM, N.C.

GET A LIFT WITH A CAMEL!

ARMOUR
INSTITUTE OF TECHNOLOGY

Armour ENGINEER and Alumnus

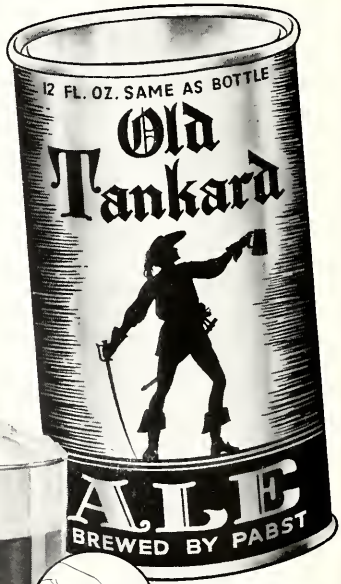
DECEMBER 1935

Old Tankard ALE

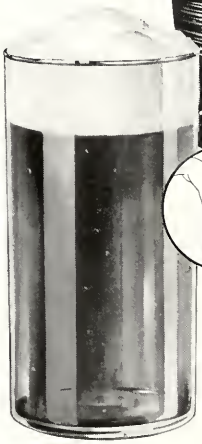
brewery flavor sealed in Non-refillable ...KEGLINED TapaCan

OLD TANKARD ALE—a hearty drink for hearty fellows. The good old-time flavor—full-bodied, full-strength, brewed and mellowed by Pabst—is caught at the brewery vats and held fixed in the sealed, non-refillable Keglined TapaCan. No light can enter to steal away the delicate goodness that makes Old Tankard the ale of ales.

Order a case today. Flat at top and bottom, the Keglined TapaCan stacks easily in the refrigerator and on pantry shelves. And it cools quickly—so you are always ready to serve yourself or your guests with the ideal beverage—genuine good Old Tankard Ale.



- PROTECTED FLAVOR
- NON-REFILLABLE
- STACKS EASILY
- SAVES HALF THE SPACE
- BREWERY GOODNESS SEALED RIGHT IN
- NO DEPOSITS
- NO BOTTLES TO SAVE
- COOLS FASTER



EXTRA VALUE

Handy New Opener FREE

With 3 or more TapaCans your dealer will give you the Quick and Easy opener FREE. A perfect opener for all cans containing liquids. Simply hook opener under rim and pull up. Easy, quick, simple to use.

Old Tankard Ale

Brewed and Mellowed by Pabst

G-E *Campus News*

EDITORIAL BOUQUET

IT IS very pleasant to have people say nice things about one. The pleasure is curiously heightened, however, when the nice things are said in a roundabout way—never intended directly to reach one's ears. General Electric recently was honored in such a manner on the editorial page of the Spokane, Washington, *Chronicle*, and the Company is still basking in the warmth of the glow generated. The editorial, in part, read as follows:

"An exposition at which inventors of the Pacific Northwest will display their work will be held next month in Portland.

"It will probably be a revelation to those who see it. Most persons find it hard to think of great men coming from 'near at home.' When one speaks of inventors or scientists, the Northwest citizen thinks of the General Electric laboratories, or of observatories in California, or clinics in Vienna. . . ."

CELESTIAL PUSH-BUTTON CONTROL

HEAVENLY bodies a million times fainter than the faintest star the eye can see unaided will be brought to the earth for inspection and photography at the touch of an electric push button when the McDonald Observatory on Mt. Locke in western Texas is placed in operation. The observatory building itself is almost completed, but the technicians of the Warner and Swasey Company at Cleveland are "making haste slowly" with the polishing of the 82-inch reflecting mirror. They estimate that another 12 or 18 months will be needed before the mirror is ready for installation. The 45 tons of moving parts of the telescope will be at the command of a single individual, who will be able to take his stand upon an observing bridge and virtually order the stars to parade before him. The motors and complete electrical control to make this possible have been manufactured for the builders of the telescope by General Electric.

VOICES FROM THE SKY

WHEN the Whiteface Memorial Highway—a road leading to the summit of the 5000-foot Whiteface mountain in the heart of the Adirondacks—was dedicated this autumn, voices came down from the sky on a beam of light. There was nothing mystical about this performance, however. The beam of light came from a 24-inch G-E searchlight on the summit of the mountain. The voices were those of President Franklin Roosevelt and New York's Governor Herbert Lehman.

President Roosevelt's words, dedicating the highway, were carried on the light beam seven miles from the mountain to the crowd at the Lake Placid airport. Governor Lehman had spoken over the light beam the night before. He was so interested that, after the dedication ceremonies were finished, he spoke again to demonstrate the equipment to the members of his family. Both night and day demonstrations were successful, although once or twice during the day the words faded to faintness when small clouds floated by the mountain top and partially obscured the light beam.

Two-way communication was carried on by means of short-wave radio equipment located at the airport. G-E engineers, who made this special installation, had to transport a gas-driven power plant and a dozen or more storage batteries to the mountain top to operate the talking light beam.

96-205DH

GENERAL ELECTRIC

ARMOUR ENGINEER and ALUMNUS

DECEMBER 1935
VOLUME 1 NUMBER 2

IN THIS ISSUE

Published in October, December, March, and May, in the interests of the students, college, and alumni of Armour Institute of Technology, under the direction of a Managing Board, consisting of H. P Dutton, W. Hendricks, H. Milleville, D. P. Moreton, chairman, and H. Nachman at 3300 Federal St., Chicago.

Bringing best wishes for

A very Merry Christmas

And a bright New Year

Carving With Dynamite

By Milton B. Holland

A GREAT NATIONAL Memorial is now being carved on Mount Rushmore. The portraits of Washington, Jefferson, Lincoln, and Roosevelt will be carved from the side of a mountain. These portraits are not so much to commemorate the men themselves as to record the foundation, the expansion, the preservation, and the unification of our great western republic.

To those millions who have not seen the Memorial except as a picture in a book or in a movie, the monument appears to be little more than a work of sculpture. However, those who have been within a few thousand feet of the unfinished project, have heard the sounds of dynamite blasting and compressed air drilling. Instead of a sculptor with a hammer and chisel, we find about forty men engaged in carving with dynamite.

After I heard these unmusical sounds I realized that the Mount Rushmore National Memorial was of particular interest not only to the artist, the historian, and the patriot, but also to the engineer.

As I wanted to learn more about the project I climbed to the top of the mountain. Access to the summit was gained by means of a series of wooden stairs connected by cleated wooden inclines.

Granite Base for Figures

The material of which the mountain is formed is a granite (pegmatite, as I later learned) peculiar to the Black Hills of South Dakota. The fact that the rock is granite proclaimed at once the enduring qualities of the mountain.

Nearing the top, I noticed that the figure of Washington and the half completed figure of Jefferson lost all resemblance to the men themselves. Workmen and tools were being lowered over the foreheads of the figures by strong steel cables, and men at winches could be seen letting cables up and down in response to the "up," "down," or "whoa" of the call boy.

In order to approach the work a man with jack hammers and half a dozen four foot drills is sent down over the side of the cliff with orders to cut off a certain projection. The man sits on a leather swing with an iron or steel seat, leather covered. This swing, held by a ⅜-inch cable, is controlled by a hand windlass. The occupant is strapped in; he may become injured, faint, or lose control of himself, but he cannot escape from the swing without removing the straps that hold him in.

I asked Mr. Tallman, the construction foreman where the drillers obtained the compressed air. He pointed to a small building at the base of the cliff. This was the compressor house. It contains two Ingersoll-Rand type ER-1 air compressors, a 14x12 and a 12x12, each driven by a 75 hp. General Electric Induction Motor. The motors are 3 phase, 60 cycle machines. They are rated at 440 volts and 118 amperes. At full load they develop a speed of 875 r.p.m. The two compressors are connected in series with a third compressor. If the load becomes too great for any one machine, another compressor automatically takes up the overload. The combined capacity of the three machines is 1200 cubic feet per minute. The machines are water-cooled, the water being cooled in open racks and pumped into a reservoir from which it enters the cooling compartment of the compressor by means of gravity. The compressed air line to the summit of Mount Rushmore is 1600 feet long, starting with a diameter of 4 inches and gradually decreasing in diameter, terminating with a 1½-inch pipe.

Mount Rushmore National Memorial

From Model to Mountain

Before the actual carving is performed a model of the figure is made. Let us use the figure of Washington as an example. Gutzon Borglum, the sculptor, first prepared small scale models to get the general appearance of his subjects. He did this work in a studio, having a large window looking out upon Mount Rushmore so that only a glance was required to compare the model with the mountain. Next, a working model of Washington, five feet from the chin to the top of the head, was made. This model was taken to the top of Mount Rushmore and used to guide the carving of the great stone head. The measurements taken from the working model are multiplied by 12—an inch on the model being a foot on the statue.

In order to transfer the measurements to the stone of the mountain an ingenious device, developed by the sculptor, is used. A point is established on the mountain which locates the top and center of the figure's head. On this center point there is mounted an upright steel cylindrical shaft. This shaft rests on a base of steel—a circular plate about four feet across its flat surface. On this are cut one-

(Turn to page 22)

A Summary of the President's Report

The first section of the President's report for 1934-35 is entitled "Financial Review." It describes the sources of funds with which Armour was built up and maintained in the past and concludes with an expression of gratification that appreciative alumni have helped sustain the Institute during the past decade of transition and depression. Gifts of nearly one million dollars since 1926 have made it possible to carry on in an exceptionally difficult period and, at the same time, to lay foundations with thoughtfulness and care for the forward movement now in progress.

The second section, "Program for the Future," discusses undergraduate work, graduate study, research, relation of research to graduate study, and teaching and research personnel. A proposal to establish a research corporation was approved in principle at the May meeting of the Board of Trustees. Since then, the President, Chairman of the Board, and members of the staff have conferred with leaders of engineering research throughout the country, and a document which sets forth a plan of organization and policies is being reviewed by a selected list of distinguished scientists and engineers. The proposal assumes that research personnel of the foundation will participate in graduate teaching and that the subject matter of research will be available as thesis material and otherwise for Armour students. All the plans for graduate study and research are predicated on maintaining and constantly improving the undergraduate course.

The next two sections deal respectively with departmental requirements and opportunity for special financing. The object underlying discussion in both these sections is to analyze particular needs so that future appeals for funds may be addressed to the subject in which the prospective donor is likely to be most interested. Metallurgy, Aeronautics, Air-Conditioning and Refrigeration, Automotive Engineering, Sanitary Engineering, and Soil Mechanics are given special mention among the subjects which should be actively developed through special endowments. Attention is also called to the desirability of special endowments for particular professorships and for the library. The need for an endowment to provide retiring allowances is especially emphasized.

A whole section of the report is devoted to scholarships and loan funds, and a plea is made for an endowment sufficient to provide 100 scholarships, each covering the full cost of instruction. Under present conditions, without any charge for interest or depreciation, this cost is about $500 as against the $300 tuition fee. Announcement is made of the creation of the Isadore S. Prenner scholarship out of the proceeds of a life insurance policy which Mr. Prenner, a deceased member of the class of 1897, took out for that purpose.

The section on site and plant reviews the efforts to move and describes the booklet, "A New Home for Chicago's Center of Education in Engineering and Architecture," which was presented to the Board at its May meeting together with options on a north side site. It is pointed out that the specific proposal, which the Board approved in principle at the May meeting, was not intended to preclude consideration of other promising approaches to this urgent problem. The proposal served to focus attention on the main objective; the administration and the Executive Committee, as instructed by the Board, are actively at work on the solution of the site problem and the closely related problem of producing adequate capitalized income to insure the constant enrichment of the service which Armour renders.

The report concludes with announcement of two resignations from the Board and the election of three new members, Claire L. Barnes, Newton C. Farr, and Harris Perlstein, an alumnus of the class of 1914. Expressing appreciation for the service rendered by the Board, it is noted that the Chairman and members of the Executive Committee have carried a heavy load and have dealt with many difficult problems with exceptional patience and poise.

With the President's report are printed reports by the Dean, the Director of Research and Testing, and the Director of Physical Education. Together, the reports give a detailed story of the year's events.*

*The booklet containing these reports is available to students on request, and will be mailed to any alumnus or friend who fills out and mails a post card or the coupon below.

Armour Institute of Technology

3300 Federal Street,

Chicago, Illinois.

Please send a copy of the complete report to:

Name

Address

City

The 1935 Machine Tool Show

By Harry S. Nachman

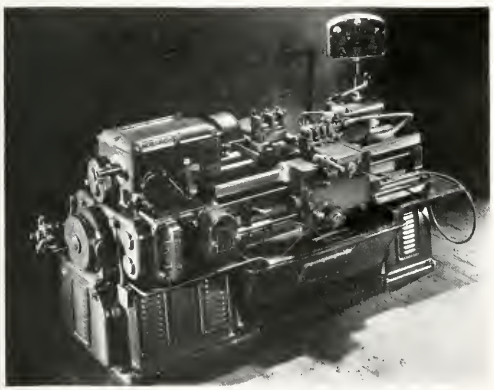
LEAVING THE economists to their controversy as to whether or not it should be done, the machine tool manufacturers have spent the depression years in further mechanizing a mechanical age.

The 1935 Machine Tool Show, the first since 1929, held in Cleveland, in September, brought to its restricted attendance a story of technical progress in those six years which is allowing machine work a measure of perfection never before achieved. Hydraulic feed, die-tracing, multiple spindle operations, surface broaching, perfected gear cutting—these may not be new terms, but they are processes which have been developed to a much higher degree of commercial application during the depression. The falling off of orders has left large plants with little to do but research, and the machine tool manufacturers have responded to this opportunity.

Fig. 1

Speed! It is not the criterion of work today, but it is the factor most impressive to the observer. The pieces shown in Figure 1 are turned out in 8 seconds (the piece on the left), and 12 seconds for the piece on the right. These were taken from a solid rod of constant diameter, and the reader is invited to count the operations made on each piece in the amazing time mentioned.

Speed! Marvelous new gear cutters cut a herringbone gear on both sides at once and meet in the middle within .001 inches, and all at a speed of 250-500 cutting strokes per second. Or they will



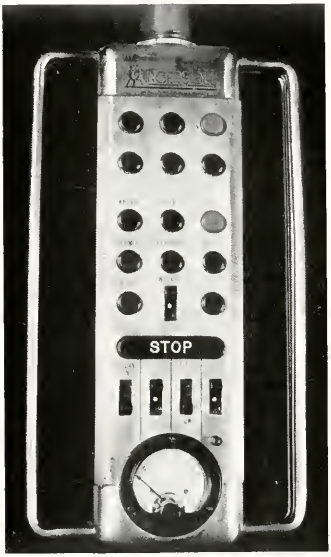
Electrically Controlled Magnomatic Lathe
Courtesy Monarch Machine Tool Co.

cut a big spiral bevel gear in eleven minutes, a process that would take as many hours by hand.

And yet speed is not the essential. All these machines could be run even faster if the search were not for economy. The cutting tool can stand only a certain strain, and production is thus limited by minimum cost rather than speed. Machine tools are apparently more wisely operated than automobiles.

Marked advances in precision have been made in every branch of the industry. Universal use is made of hydraulic feed where moving tables are involved, a principle which requires fewer parts and gives smoother operation than the old gearing methods provided. Beauty has become an essential feature of machine tool manufacture, and the hydraulic feed has helped make this possible. Each machine is almost completely enclosed in a handsome housing which leaves very few moving parts visible.

Control Pendant for Open Side Milling Machine



Courtesy Ingersoll Milling Machine Co.

An outstanding invention is die tracing. A machine for this purpose was exhibited which weighs 250,000 pounds and is rated at 275 horsepower. The construction of metal figures by tracing is not a new idea, but its application to the very rapid and accurate making of dies is only recent.

A 200 ton planer on the floor showed a tool that "cuts two ways." In old style planers, the cut was made only on the forward motion of the table which had then to be brought back to position, but the two way cut provides a mechanism which simply reverses the tool when the table is reversed, thus doing the business coming and going.

Multiple action machines were demonstrated by many companies. A combination milling, boring, and threading unit whose whole galaxy of motions is controlled by 36 electric buttons was displayed. (Machine shop work will be a white collar job soon)! Under this classification are the machines which

(Turn to page 22)

Opportunities for Part-time Studies in Evening Classes

By H. T. Heald, Dean

SEVERAL THOUSAND residents of Chicago have availed themselves of the opportunity to secure part-time instruction in engineering and architecture at Armour Institute of Technology since the evening classes were started in 1907. Some of these students have followed well integrated programs of study lasting for several years, while others have been interested in only a single specialized course. No complete record of the carriers of these "alumni" of the evening school is available, but many prominent citizens of Chicago are included in their number.

This year, the Evening Division of the Institute is offering a more complete series of courses and a better integrated program than ever before. The student enrollment is well over 800, the highest for six years, and about thirty per cent in excess of 1934. As the result of some study of the evening curriculum made during the last year, three distinct types of programs are now available. The first of these provides special sequence courses in engineering and architecture for adult students not interested in college credit or degrees, but who wish to secure adequate training in various branches of engineering and architecture. These courses enable men engaged in technical occupations, who wish to extend their education, to build up a knowledge of foundation subjects and of a wide variety of technical applications. This work, in general is adapted to the needs of men who have some practical acquaintance with the subject matter and desire material of immediate value. All of these studies are of college grade, but some of them do not carry credit towards a degree because of their intensive character.

A second group of courses is designed for high school graduates who desire to cover the regular college course in engineering or engineering science in evening and Saturday classes. At present, this work is arranged to make possible the completion of the first two years of college in a minimum of four years intensive evening study. Few classes are now being offered beyond the Sophomore year of the regular course, but as the demand for additional work makes itself evident it seems probable that the entire degree course may be included in the Evening Division. Although this is the first year that the evening program has been definitely organized on a college credit basis, more than three hundred students are enrolled in these courses, with about one hundred in beginning classes.

The third group of courses is designed primarily for college graduates and may be taken for credit toward an advanced degree. Work is already being offered in Chemical Engineering and in Civil Engineering, and beginning in the Spring semester, one post-graduate course will be offered in all engineering departments. This program will make it possible for an engineering graduate to secure the Master of Science degree by two or more years' attendance in the Evening Division. The Institute will thus be adding materially to the services offered the Chicago area, since there are many college graduates who will profit from the opportunity to carry on post-graduate study.

Enrollment in evening classes seems to be a direct index of conditions in industry. In 1928 and 1929 large numbers of students were studying architecture and structural engineering, while in recent years very few have been preparing for these professions. About the same time, aviation attracted a great deal of popular interest, and enrollments in courses in flight training and ground school courses in aeronautics were large. This interest largely subsided when the general public realized that aeronautics did not offer exceptional opportunities to everyone. More recently, heating and ventilation, air conditioning and Diesel Engineering, have attracted wide interest. Over one hundred students were enrolled in courses in heating and ventilation and air conditioning last year, with only a small decrease this Fall. A new course in Diesel Engineering this year, made possible by the addition of considerable equipment to the automotive laboratory, has attracted a capacity enrollment.

An interesting course in Industrial Management is being given for the first time this year. This course is designed for industrial supervisors and executives, and includes a study of industrial problems such as design, layout, process analysis, production and budget control, and training and management of personnel.

Nearly all students in the Evening Division are employed. Enrollment for the first semester of 1935 includes representatives of over four hundred firms in Chicago and vicinity, the number of students per individual firm ranging from one to thirty-eight.

Armour Institute of Technology feels that the work of the Evening Division is an important part of the service offered to the Chicago area. Methods for increasing the effectiveness of this program are constantly being sought, and suggestions are invited.

Life is not a goblet to be drained; it is a measure to be filled.

—A. T. Hadley.

I like to see a man proud of his city, and I like to see him live so that it is proud of him.

—Lincoln.

He is very lonesome who has nothing but dollars.

Meet the Trustees

GEORGE B. DRYDEN, president of the Dryden Rubber Company, is a veteran in the industry, a man whose service is approaching its thirty-fifth anniversary in spite of his "hobby", big game hunting.

A native Ohioan, Mr. Dryden's interests are now in Chicago, where he heads his own concern, and is vice-president of the Enoz Chemical Company, as well as a director in the City National Bank, Borg-Warner and Marbo Products Corporation, and the Rubber Manufacturers Association.

Judging by a list of clubs, Mr. Dryden must be a golfer as well as a big game hunter. We are hereby informing the trustee that some future issue of the *Engineer and Alumnus* should contain an article on his experience in the jungle or forest (not the rough).

THE biography of ALFRED L. EUSTICE, which took three pages in a recent periodical, is not easy to condense into this space. The president of the Economy Fuse & Manufacturing Company has had an eventful life.

Born in Galena, Illinois, he was brought up on the stories of his father's neighbor, U. S. Grant. But history in Galena shares place with industry, and the influence of his surroundings led Eustice to Armour, from which school he graduated in 1906.

An electrical in school, he found a research job with the Westinghouse Electric and Manufacturing Company, and although his job went out with the company's failure, and although a venture in which he and two other men were interested collapsed after that, he carried with him a reputation of inventive ability and analytic capabilities which are outstanding characteristics.

He carried away something, too. The memory of a little invention, a sideline hobby of an associate stirred Eustice's fancy. This was the beginning of the Economy Fuse and Manufacturing Company. This simple statement does not intimate the "trials and errors", disappointments and setbacks which paved the road to the success of this, one of the largest companies of its kind.

Trite as it may sound Mr. Eustice is an "outdoor man." He may be found riding one of his fine horses or in overalls on his farm near Chicago in spare moments, or, if you should catch one of his rare open hours at the plant, he may give you a story of his experiences in the Wisconsin wilds.

NEWTON C. FARR is approaching his fiftieth year and his fiftieth membership in some organization, or on some board, with equal rapidity. The senior partner of Farr & Company has been actively engaged in real estate brokerage and property management for nearly a quarter of a century, and in that time has been active in an amazing number of interests.

A civil engineering graduate of Cornell, Mr. Farr soon turned his eyes to Chicago, his birthplace, and to real estate appraising, especially in types of property found in metropolitan areas. In recent years he has been particularly prominent in Cook County affairs. His high place in this work is attested by his chairmanships in the Chicago Recovery Administration and on the Cook County Assessor's Advisory Commission on Land Values.

Trailing his list of "clubs", Mr. Farr notes the solitary word "Republican." Is that an admission of the status to which the G. O. P. has fallen, or does it belong with "recreations", which feature golf and music?

EDWIN O. GRIFFENHAGEN and Associates—management engineers — consultants in the fields of government and industry. On New Year's Eve these men will celebrate (among other things) the fifteenth birthday of an organization whose two most spectacular jobs were, perhaps, the reorganization of the Canadian Government, and the revision of the U. S. Government's Civil Service personnel policies. Absolutely unrivaled in their experience in state work, Griffenhagen and Associates have served almost twenty states in governmental problems of organization, administration, operating procedure, personnel and finance.

Between the times of his graduation from Armour (C. E., '00) and the formation of the company, Edwin O. Griffenhagen had distinguished himself, to say the least. He was designer and office engineer on the Chicago, Milwaukee and St. Paul Railroad, in charge of a project involving extensive use of reinforced concrete for the first time.

In 1909, the City of Chicago called him as architectural engineer, in which capacity he helped draft the building code. In the following year he was transferred to the Civil Service Commission where he first started on personnel work, instituting a reorganization of the department of public works which exists, unchanged, today.

AN Armour trustee since 1933, GEORGE IVES HAIGHT is a well-known Chicago lawyer. He was born near Rockdale, Wisconsin, on March 26, 1878, and received his primary education in the district school. He graduated from Northwestern University Law School in 1902, and immediately embarked upon his successful legal career.

Mr. Haight is a lover of letters, personnally as well as professionally. He maintains a very fine library and an excellent collection of etchings. Nor is he only an onlooker in the matter of art. Two of his hobbies are etching and painting. He also prefers fishing and sailing, pastimes which his Lake Shore Boulevard home in Evanston do not discourage. A review of his biography leaves the reader with a definite impression that George I. Haight has the enviable capacity of enjoying life.

THE colorful career of THOMAS S. HAMMOND may be better recalled to many by the name TOM HAMMOND, whose brilliant gridiron exploits as a team-mate of the late Walter Eckersall at Hyde Park High, in Chicago, and as an opponent of Eckie, on Coach Fielding Yost's "Point-a-Minute" teams at the University of Michigan, have formed the subject of many "when-I-was-a-boy" stories.

In 1907, Mr. Hammond entered the employ of what is now the Whiting Corporation of Harvey, Illinois, where his present position of President and General Manager is the last step in his steady rise through the positions of Purchasing Agent, Assistant Secretary, and Vice-President and Secretary.

In 1916, Mr. Hammond started his military career on the Mexican border during the dispute between governments. Shortly afterwards, he embarked for France, where he served eighteen months with the 149th U. S. Field Artillery. In 1931 he was commissioned Brigadier General.

Mr. Hammond has held presidencies of numerous metal and manufacturers associations, and was honored with a governmental Directorship during the first year of the New Deal.

THE month of his graduation from Armour, June 1905, found ROBERT B. HARPER in the employ of the Peoples Gas Light and Coke Company. More than thirty years of continuous distinguished service in this organization have passed, and the ex-Assistant Chemist is now Vice-President in charge of Research and Testing, a position he has held for almost six years.

Mr. Harper, a native of Evansville, Indiana, entered the University of Chicago in 1900, but transferred to Armour in the following year and received his B. S. in Chemical Engineering in 1905 and his Chemical Engineer degree in 1909.

His steady rise in position in the gas company does not mark Mr. Harper's only activities for it. He has worked extensively in employee organizations for social, educational, and recreational benefits, and on management committees for the study of personnel advancement. He has traveled through Europe and North America to conduct investigations of gas plants in ten countries.

The life of R. B. Harper has been devoted to the study of gas, a fact testified by his activities, articles, and clubs, but he has always had time to show a keen interest in the welfare of his alma mater.

ANOTHER Armour product is ROY M. HENDERSON (B.S.E.E. 1902—E.E. 1906), a man whose Armour spirit embraced even his marriage—to an alumna of Armour Academy.

The President of United Engineers and Constructors, Inc. (a merger of four companies) has devoted his life to power and manufacturing plant construction. His first job was with the Mexican Central Railway, where he became foreman in charge of installation of equipment at the principal car and locomotive shops at Aguacaliente. (No, the racetrack wasn't there at that time.)

His railroad work was continued in the United States until 1907, when he took a position at Stone and Webster Engineering Corp. of Boston. In the Hub he superintended construction of public utility plants, and was later sent to Chicago to serve the company's interests in the middle-west.

In 1918, Mr. Henderson became Vice-President of Dwight P. Robinson and Co., and during the peak years of that great corporation's greatest success expanded his interests to commercial fields in the negotiation of new business. In 1928, Robinson and Company merged with three others to form the United Engineers and Constructors, Inc., and in the following year Roy M. Henderson was elected president of the new organization.

HOBBY: Golf. Life work: Fire Insurance. That is a brief autobiography of ERNEST A. HENNE, whose position now is Vice-President of the Continental, Fidelity - Phenix, Niagara, American Eagle, First American, and Maryland Fire Insurance companies.

Mr. Henne was born in Germany, but emigrated to America in his boyhood. He was educated in the public schools of Fort Scott, Kansas. Fire insurance has claimed his activities during his adult life. He is President of the Western Underwriters Association for 1934-35. Besides occupying positions already mentioned, Mr. Henne is a director of the First American Fire Insurance Company of New York, of the Western Adjustment and Inspection Company, of the Underwriters Salvage Company, and of the Western Factory Insurance Association.

CHARLES W. HILLS, JR., was born in Shelby, Mich., in 1888. He had his preparatory education at Armour Scientific Academy and the University High School, Chicago. He is an alumnus of Armour Institute of Technology (B. S. in E. E.) and Chicago Kent College of Law (LL.B.). In 1910, he entered into the practice of Patent, Trade Mark, Copyright, and Unfair Competition Law, becoming a member of the firm of Charles W. Hills with offices in

(Turn to page 12)

Employment Among Armour Graduates

W. N. Setterberg, Placement Officer

IN THE past four years, about 1000 placement records have been filled out by Armour alumni aspiring for new or better positions. Included among these sheets, which represents about 25% of the alumni of the Institute, are the records of a few men who completed their work way back when Armour Institute of Technology was in its infancy. However, as can be expected, the bulk of the file is made up of records of graduates of the past four years, for it was during these years that the Institute made a concerted effort to place its alumni.

This file has served its purpose well; and as the years pass it will become more and more valuable. Yet, with about 1000 records from which candidates could be chosen, there were times when it was impossible to find men who had the necessary qualifying experience. This speaks well for our graduates, because, in most cases, those with the necessary experience were satisfactorily employed. Without substantiating data, no figure can be given as to the percentage of Armour alumni now engaged; but it can be safely estimated that between 85% and 90% of the 4300 alumni are now employed. This estimate, of course, includes many positions and jobs completely outside the architectural and engineering fields.

From external indications and information from current business bulletins, opportunities are beginning to appear for the technically trained man. As a basis for this confidence in the return of activity it can be stated that about 90% of the graduates of the classes of 1934 and 1935 are now satisfactorily placed. The class of 1935, of which there is more accurate information, is 85% placed. An analysis of the record of the class of 1935 indicates the following: Architects 77%, Chemicals 72%, Civils 74%, Electricals 90%, Fire Protects 100%, and Mechanicals 77%. It is interesting to note that the architects, whose normal field of activity is that of building, have kept pace with the others whose training has been in engineering. Industrial art design and government service have absorbed a great number of the architectural graduates, and with the inevitable return of the building industry there will be no end of opportunities for those interested in construction.

Whereas federal projects large and small have aided greatly in keeping engineers and architects busy through the depression, it is safe to say that those interested in construction will soon find that private enterprise will again be the important field of activity.

Armour Tech Relays

By John J. Schommer

Have you ever heard of the "Armour Tech" Relay games? This meet is held every year in March at the Field House of The University of Chicago. This track athletic carnival has grown by leaps and bounds until last year there were thirty-six colleges and universities with four hundred and eight athletes competing in relay races and special events. One record was tied and three were broken. Joe Knappenberger of Kansas State won the seventy yard hurdle race and tied the record 0.07:6 made by Sanbach of Purdue in 1933; Irving Seeley of Illinois broke the pole vaulting record by soaring over the bar at 13 feet 5⅞ inches; Frank Davis of Hillsdale broke the 16 lb. shot put record by a heave of 48 feet 4 inches; and the University of Pittsburgh broke the one mile relay record by winning in the time of 3:21:9.

The big thrill of the evening came to students, faculty, and hundreds of alumni of "Armor Tech" when "our boys" won the Medley Relay in 4:33:3. The team was composed of the following students: Neal, Dunbar, Neuert, and Nelson.

How would you enjoy an evening watching crack athletes from all over the U. S. competing for athletic honors with the cheers of the various colleges ringing in your ears; hearing your "Tech Orchestra" playing stirring music; and meeting and seeing hundreds of "Tech" alumni, professors, and students? Does this scene stir you? Then be with us at the next "Armour Tech" Relay Games—the 8th—at The University of Chicago Field House, 56th and University Avenue on March 21st 1936, 7 p. m. to 10 p. m. Since the crowds tax the seating capacity and hundreds stand, you will have to be there early if you want a seat.

Meet The Trustees

(Continued from page 11)

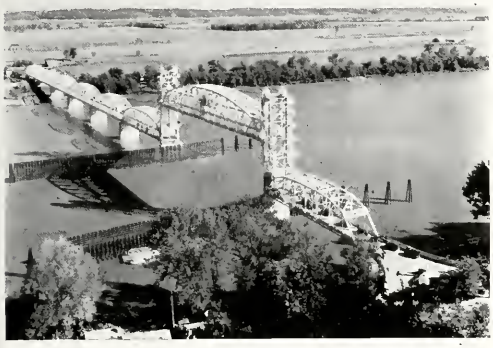
Chicago and Washington, D. C.

Mr. Hills, Jr. was active in school affairs while at Armour. He was business manager of the "monthly", then known as *The Fulcrum;* also on the staff of the *Integral.* He was a member of "Sphinx," "Radical X", and Delta Tau Delta Fraternity. He has maintained a continuously active interest in Armour Institute of Technology since 1910 when he left to take up professional and business life.

The Determination of Bridge Layouts

By Charles E. Morgan
Of the Illinois Division of Highways

THE DETERMINATION of a bridge layout for any particular crossing of a stream depends, first of all, upon the volume of water which will run under it at "high water." With the elevation of the highest water known, the breadth of the stream at this stage, and the profile of elevations along the proposed centerline of the bridge, one can determine the cross-sectional area required under the lowest projection of the proposed bridge. For bridges over railroads, highways, etc., there are definite require-



Low Level Lift Span, Hardin, Ill. Length 1,709 ft.

ments as to vertical and horizontal clearances; the standard clearances might be modified for some particular crossings. Railroads usually require 21 to 23 feet vertical clearance and from 11 to 13 feet horizontal clearances on each side of the centerline of track. Highways usually require 14 feet vertical clearance and a horizontal clearance of about two feet outside of the paved roadway on each side.

The minimum clearances of bridges over navigable streams are usually set by the War Department and by the State Division of Waterways. These clearances will depend upon the particular crossing. When the vertical and horizontal clearance have been determined, further determination of the bridge layout will or should proceed along the line of economy of cost and maintenance.

The economic considerations will, first of all, be based upon the anticipated traffic the bridge will have to bear, and the period of time for which this traffic is to be provided; secondly, the funds available for the initial design and construction, and the future funds to be available for maintenance.

While considering the matter of economy of cost of the bridge, it will be well to note here that the present tendency of bridge designers is to employ continuous types of bridges much more often than they have in the past. An appreciable reduction in the initial cost of a bridge can usually be obtained by the use of continuous spans instead of simple spans.

The following discussion is based upon the assumptions that there be sufficient funds available for a durable construction, and that the structure is to be used for an unlimited period of time. Temporary bridges will require almost as careful a study, and each is likely to be a special problem.

Some Practical Geology

The determination of the best layout and the most economical one for any particular crossing requires a thorough understanding of all of the various phases of bridge engineering and construction; with an intimate knowledge of the physical conditions of the site. Sufficient boring data must be secured to determine the character and the depth of the foundation material. The nature of the stream, the time of the year at which high water occurs; the elevation of ordinary high water; the elevation of the highest high water; whether the stream or river carries drift or ice at high water; whether it rises slowly or quickly; whether or not there would be scour around the piers, etc., must be known before a rational design can be made. It is also desirable to know between what elevations of the water level does ice "go out" in the Spring. This will enable one to make a more satisfactory pier design than one could make without such information.

The design of the layout will also be affected by many other items, such as the availability of suit-

Modern High Level Bridge, Ottawa, Ill. Length 1,000 ft.

able local materials, the supply of local labor, the requirements of the War Department for clearances during erection, etc.

Culverts for Short Spans

Crossings requiring horizontal clearances up to 15 feet can be more economically taken care of by the

use of culverts than by the use of a more elaborate type of structure. For clearances from 15 to 25 feet the ordinary "slab bridge" with concrete or steel rails is generally the more economical type. For spans 25 to 35 feet the reinforced concrete deck girder bridge is generally used, although it is not quite as cheap as the steel I-beam with concrete floor and rails. For single spans 35 to 85 feet the concrete rigid frame bridge is a more economical type than the reinforced concrete deck girder bridge; this is particularly true for the longer spans in this range. For single spans between 85 and 125 feet the steel rigid frame girder bridge is considered to be more economical than the ordinary plate girder bridge, which has been the usual type for spans of these lengths. For single spans of 125 to 175 feet the parallel chord steel truss with a concrete floor is economical for a durable type of construction. For spans between 175 and 300 feet the curved chord steel truss is the usual type. Where there is sufficient vertical clearance—obtained without any additional cost—the steel deck truss will be slightly more economical than the through truss.

For bridges over overflow areas, grade separations, wide shallow streams, etc., where relatively short spans may be used in multiples of two, three, or four spans, the Bridge Department of the Illinois State Highways are now using continuous steel I-beam bridges with concrete floor and rail, in units up to four spans. This type of bridge is considerably cheaper than any of the other durable types. There is a slightly greater maintenance charge for this type than for the concrete deck girder type. The economical range of spans for this type is from 30 to over 100 feet.

When the most satisfactory grade line of a road is obtained with the minimum distance from crown of roadway to lowest projection of bridge members, (in order to comply with vertical clearance requirements); the rigid frame type, either steel or concrete, will show a decided advantage.

Long Spans Considered

Crossings over 300 feet and requiring spans of 300 feet and over will rarely occur, except for crossings over navigable streams; these layouts will be materially influenced by the vertical and horizontal clearances required by the War Department. In these cases the most economical layouts have to be made for the clearances required, and will not often be the most economical layouts that could be made to take care of river flow alone.

In the consideration of long crossings, requiring multiple spans, one must keep in mind that it is the minimum total cost of structure in place and ready for service that is the criterion of economy. To achieve this requires considerable knowledge and judgment on the part of the designer. Where the costs of the abutments are equal, and the costs of the piers are all the same, the minimum total cost of the structure will be when the cost of the superstructure and the cost of the substructure are approximately equal. For this case the lengths of the spans would be proportional to the square root of the cost of a pier. Such a layout would be an accidental case. In general, then, this simple relationship will not exist, and if a reasonable degree of economy is to be obtained two or more preliminary designs would have to be made.

For river crossings of 1200 feet or more, and requiring channel spans of 400 feet or more, it will usually be more economical to use a three span continuous truss at "high level" than to use a "low level" bridge with a lift span over the channel. The greater number of river piers, the lift span royalty and cost of annual maintenance, makes the low level bridge for navigable rivers compare very unfavorably with the "high level" continuous bridge. Comparison made by the writer of a "low-level" highway bridge with a "high-level" bridge with a three-span continuous truss showed that the "low-level" bridge costs 165% as much as the "high-level" bridge. The "high-level" bridge (in order to satisfy drainage requirements) was over 100 feet longer than the "low-level" bridge. In addition to the initial cost, the low-level bridge has over $5,000 annual maintenance expense for the lift span.

Concrete Limited by Economy

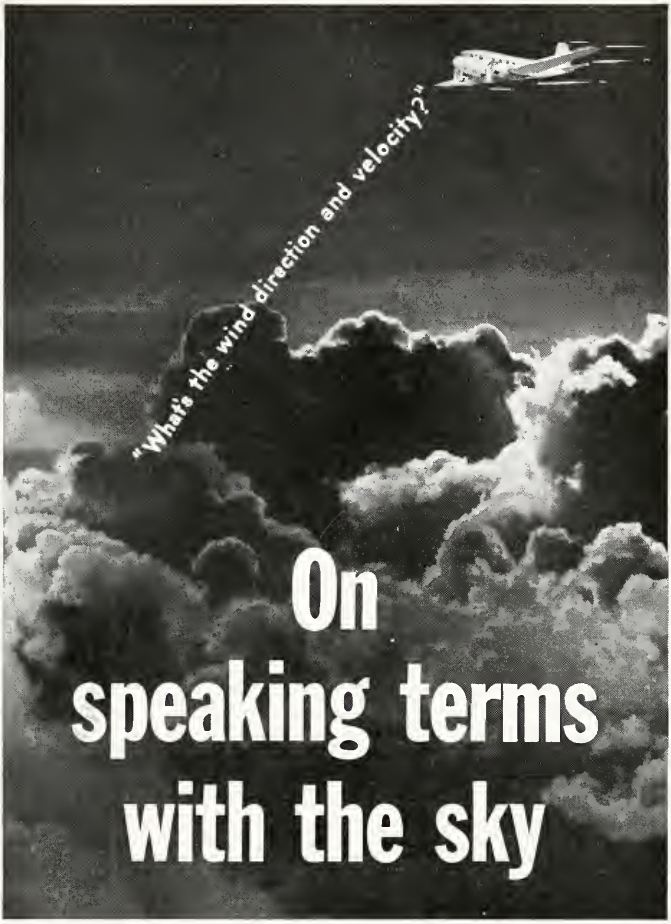
Concrete arch bridges, while satisfying all the requirements for durability, are not economical structures. They are used primarily where beauty and the fitness of the location is concerned. The steel arch can be made a beautiful structure, with reasonable economy. The suspension bridge is not an economical type, except when spans must be of great length, 1000 to 2000 feet. For such great span lengths other types are not feasible. However, some recent attempts have been made to adapt the suspension bridge to comparatively short spans.

No great standardization of bridge layouts can be obtained without material loss of economy. Each site, with its requirements would probably indicate a limited range of possible selections as to types, span lengths, etc., but only comparative layouts would disclose the most desirable one within the indicated range of possibilities. Quite often it will be found that considerable grace and beauty can be put into a bridge at little additional expense.

GIFTS TO THE LIBRARY

Recent gifts to the Library include a very valuable set of Water Supply Papers of the U. S. Geological Survey, namely issues 1-660. These early numbers, given by E. T. PERKINS, of Chicago, are very rare. Interesting early volumes of engineering annuals and textbooks in mathematics and engineering were presented by C. W. POWELL and H. H. VORISEK.

A new book on Chicago Building Costs, a beautiful and painstaking analysis of unit costs in 22 classes of structures, was donated by its authors, EUGENE and MAX FUHRER, Armour alumni.



FAR above the clouds, on all the leading airlines, your pilot is always within hearing and speaking distance of airports—via Western Electric radio telephone. ¶ This equipment, made by the manufacturing unit of the Bell System, is helping the airlines to set a notable record for fast, safe transportation. Teletype—another Bell System service—speeds printed weather information to airports. Long Distance and local telephone facilities, too, play important parts in airline operations. ¶ Bell System services reach out in many directions to the benefit of industry and commerce.

You can "fly" home by telephone, in a couple of minutes. Why not do it tonight? Station-to-Station rates are lowest after 7 P. M.

BELL TELEPHONE SYSTEM

COLLEGE CHRONICLE

THE RESULTS of the class elections recently held were as follows: R. A. Peterson, president of the Senior class; H. J. Bodnar, of the Sophomores; and Bernard Oswald, of the freshmen. The junior class adopted the commission form of government, with two representatives from each department comprising a governing body. Joe Bartusek was chosen president.

* * *

The Armour Tech Musical Clubs have already presented several concerts, and many more have been planned for the future. Otto Zmeskal will head the orchestra group and L. W. Robbie, the glee club.

* * *

R. Ruppert was recently appointed Intra-mural Manager, and he has already been active in the inter-class touch football and basketball tournament as well as the inter-fraternity basketball competition. All inter-class and inter-fraternity athletic contests will be under his supervision.

* * *

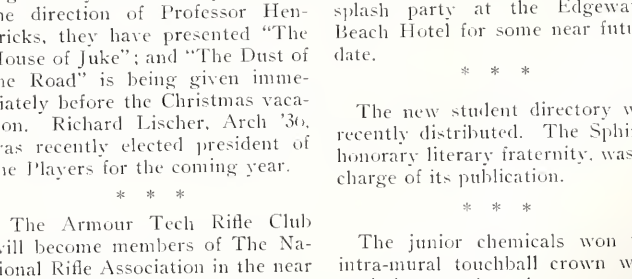
The Armour social season has been going full force with the freshman class holding their "Green Hat Ball" on Nov. 22nd at the Trianon. The Senior class held an informal dance Nov. 29th at the Medinah Club, while the Junior class schedules a dance Dec. 20th at the Boulevard Room of the Stevens Hotel. The "Arch Dance" is planned for Feb. 7, while the Sophomore class is planning a splash party at the Edgewater Beach Hotel for some near future date.

* * *

The new student directory was recently distributed. The Sphinx, honorary literary fraternity, was in charge of its publication.

* * *

The junior chemicals won the intra-mural touchball crown with a stirring overtime victory over the senior electricals. It was the first defeat for the latter in three years of all kinds of competition.



Don't Shoot, Jake

The Armour Tech players have begun the year in fine style. Under the direction of Professor Hendricks, they have presented "The House of Juke"; and "The Dust of the Road" is being given immediately before the Christmas vacation. Richard Lischer, Arch '30, was recently elected president of the Players for the coming year.

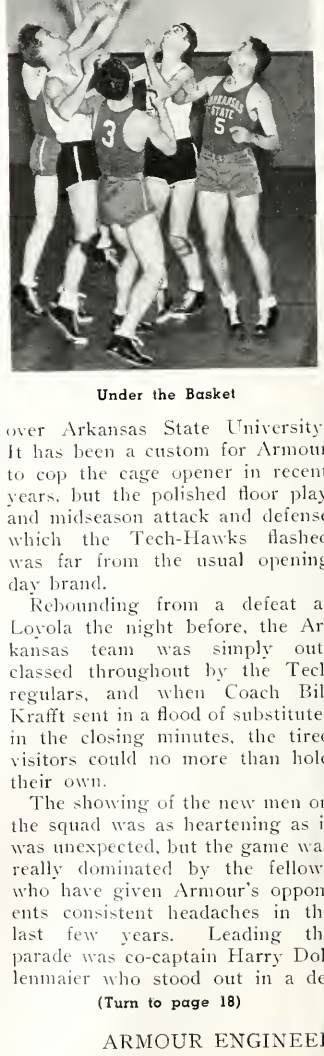
* * *

The Armour Tech Rifle Club will become members of The National Rifle Association in the near future, according to Captain H. I. McDaniel. The team is building up for its future matches, and the prospects are favorable.

BASKETBALL

Smooth!

That describes an Armour team which opened the basketball season with a brilliant 44-19 victory



Under the Basket

over Arkansas State University. It has been a custom for Armour to cop the cage opener in recent years, but the polished floor play and midseason attack and defense which the Tech-Hawks flashed was far from the usual opening day brand.

Rebounding from a defeat at Loyola the night before, the Arkansas team was simply outclassed throughout by the Tech regulars, and when Coach Bill Krafft sent in a flood of substitutes in the closing minutes, the tired visitors could no more than hold their own.

The showing of the new men on the squad was as heartening as it was unexpected, but the game was really dominated by the fellows who have given Armour's opponents consistent headaches in the last few years. Leading the parade was co-captain Harry Dollenmaier who stood out in a de-

(Turn to page 18)

FRATERNITY NOTES

Each year the Founder's Day Banquets come along. Pi Kappa Phi held theirs on December 10, at the house. . . . Pledge dances are still being held. The Phi Kaps are having theirs on December 21. . . . This seems to be the season for wandering about the country. Two junior Delts spent the week-end of December 7 at the University of Missouri, stopping one night en route at the University of Illinois, and one night returning at the University of Iowa. The Pi Kaps sent a delegate to the officers' conclave at Purdue. Sigma Alpha Mu has their National Conclave at St. Louis, the week beginning December 25. A sophomore Phi Kap is spending Christmas in Texas. . . .

New Year's parties are the most talked-of affairs at the present moment. The Phi Pi's are of course having their annual party at the house. The Delts and Phi Kaps will hold similar affairs, as will the Kappa Delts. . . . The Pi Kaps are having a Christmas Dance at the house. Triangle will give a Christmas Dance in conjunction with the Northwestern University Chapter at Northwestern University's Thorne Hall.

Phi Kappa Sigma initiated two men this month. The Pi Kaps initiated the Beta Psi alumni into Pi Kappa Phi on November 17. . . . The Rho Delts had a parents' tea on December 1. A large crowd attended. Mother's teas are being held frequently. The Delts had one on December 15. Phi Pi will have one during the Christmas holidays. . . . Sigma Alpha Mu is planning on moving to a new location. The new house has not been selected as yet. . . .

With basketball over, attention is being turned toward interfraternity table tennis. All of S.A.M.'s ping pongers have returned. They expect big things. . . . That renowned deliberative body, the Interfraternity Council, is now considering the month of February as a possible time for holding the Interfraternity Ball. We are still betting on the month of April to receive the honor, if any month is so honored. . . . The Kappa Delts are emulating the Rho Delts with an active alumni chapter

And Look at His Fist

FOOTBALL SEASON ENDS

"The football season closed the last Saturday in November with a smashing victory for Armour. The final score of the game played at St. Charles was Armour 14, St. Charles 0. The eleven men playing in that cold weather had to have a lot of courage. Capt. Jones is especially to be commended for his brilliant playing," so said the December, 1898 *Fulcrum* (Armour Institute news magazine). However, everything was not so perfect as it might have been. The team experienced several trying situations before the game. On entering the dressing room, one of the players for some unknown reason incurred the wrath of a watch dog. An interesting interlude in the team's activities followed. Numerous welts were raised on the heads of the players as a result of untimely contact with low hanging steam pipes in the dressing room.

In describing the playing field the *Fulcrum* says, "There were no side lines or yard lines and Tarbell, (one of the players) who became tired leaned against the goal post just to rest his weary form and nearly broke it down."

During the same season the team defeated Lewis Institute by an unprecedented score of 34 to 0. Lewis Institute was the bitter rival of Armour; such a victory, therefore, called for much rejoicing. The occasion was commemorated by a thirty-one verse poem which the editor of the *Integral* (Armour year-book) was inspired to write.

Throughout all the records of the team, which go back only as far as 1897, there are many references to the season of 1896. Evidently the year 1896 was a banner one in Armour football history. Should anyone reading this article know of the team of 1896 or anyone who played on that team, the editors would appreciate information.

Class on Hobo Day

(Continued from page 16)

fense which limited the visitors' attack almost entirely to shots from far out on the floor or from difficult angles, and whose aggressive floor play heralded a return to his form of two years ago.

His twin and co-leader, Pop Warner, was in top shape. Those two guards work together more than ever as one man. Gene Heike had a field day with 17 points, including his customary quota of impossible angle shots. Gene looks shiftier than ever under the basket, and, in addition, seems to have developed more fighting spirit than he has previously shown. Bob Merz, a great team player and outstanding man on defense, controlled the tipoff to give the attack all the impetus it needs. In spite of the fact that these four men have worked together for three seasons, Bill O'Brien in the other forward position looked quite at home with them. With more experience he will more than hold up his end.

In the first game, the team, holding a slight advantage in height, which was particularly noticeable in the tipoff, made the remarkable record of 20 baskets in 58 shots, a "batting average" of .345. A percentage of .250 is considered high in college basketball. In the second half the boys counted 10 times with only 22 shots.

At the same time, the close man-to-man defense held the opponents to 8 counters in 50 tries, which indicates the difficulty of their shots rather than the mediocrity of their marksmanship.

Nine substitutes who appeared for Armour late in the game showed the same sterling defense, although they lacked the drive to get into scoring position. Only O'Connell was able to connect for baskets in the last minutes, as his mates seemed unable to penetrate the Arkansas defense.

Scientific Development

SECOND HAND PHONE BOOKS

Your old telephone numbers please. Or the phone books anyway, since a new recovery method makes them almost entirely re-usable.

Dissolving the ink from the pages is the trick that now makes it worth while to collect the old phone books and recover both the ink and the paper for re-use. Costing less than a dollar per ton for the necessary chemicals, the process is used for books which have been printed with an ink compounded especially for this purpose.

A simple treatment with sulfurous acid dissolves the ink from the chopped-up books which are drenched for the process. Increasingly dilute solutions complete the removal of the ink, which is then precipitated, and the pigment is made available for re-use. The paper stock is also treated, and is then dried before starting the cycle again as a telephone book.

NO CIGARETTE BURNS

The old trick of putting a piece of copper wire in a cigar and then having the victim discover that his most violent puffing cannot keep the cigar lighted has been applied to an industrial material. Table and bar tops made of this plastic are blister and burnproof because, as in the cigar trick, they conduct the heat away rapidly enough to prevent burning. A thin sheet of metal acting like the copper wire is molded directly to the bottom of the plastic. With this, the heat developed by a burning cigarette cannot cause local overheating and blistering, since it is rapidly conducted away.

IODINE TRUST FOILED

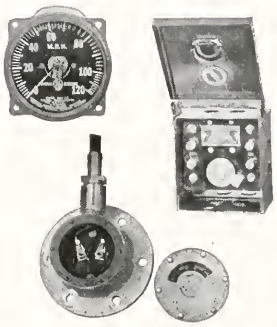
Iodine can now be manufactured from oil well brines in sufficient quantity to make the United States independent of the Chilean supply. The iodine syndicate lowered its price to one-third of the former amount in an effort to stifle the new industry, but was unable to do so. Chilean iodine is cheaper, but it is hoped that, given tariff protection, the American industry will be able to meet the Chilean monopoly in price.

Waste oil field waters from which the oil has been removed constitute the raw material from which the iodine is extracted. The iodine is liberated by acid, absorbed in activated carbon and subsequently removed with alkali, then followed by liberation and further purification. American patents cover a method in which silver is used as a combining agent to remove the iodine from the brine.

Three plants, located in northern California, are engaged in the production of iodine. The waste oil field waters are received from an oil separator which is cooperatively used by the various oil companies.

ELECTRIC SPEEDOMETER

The well known fact that the frequency of an alternator changes with the speed of the exciting field is incorporated in an electric speedometer for the new Diesel-powered streamlined trains. The speed indicator operates on current generated by an alternator which is directly keyed to the axle. Specially calibrated wires, generator brushes, or commutators are unnecessary. This indicator insures a maximum life with a minimum of equipment and wear.



All leads are inclosed within accessible reach for inspection and repair; the single alternator bearing can easily be greased whenever it is desired. The resistor box and the transformer are calibrated for wheel diameter while a manual adjustment is provided to compensate for wheel wear.

METAL CLOTHING

Non-tarnishable metal fabrics are the newest products to be made from the well-known transparent wrapping material, cellophane. The non-tarnishable metallic film is deposited on one side of a transparent sheet and two such sheets are laminated together, so that each side is metallic coated, and added strength is given to the stock. This sheet is cut into narrow widths which may be woven into fabrics with rayon, silk, wool, or cotton. It is claimed that this fabric will not tarnish or oxidize, thus solving a problem which has proved difficult in the metallic textiles industry.

In the industrial field this product may be used for window backgrounds, wall coverings, display mediums, creeping, shredding, embossing, and lithographing, so that this new material may not only be used for milady's gowns but also enter into much of the advertising which sells them.

SOY BEANS AGAIN

The "Oriental Menace" in the food industry—soy beans—seems to be due for local expansion as American acreage is increased to keep up a supply of bean pulp for the plastics manufacturers. One of these producers is now erecting a five million dollar

plant to be used in making plastic materials with these bean residues as a base.

The oil which is extracted from soy beans is thus made available as an edible oil, but it has been little used in the past, in spite of its recommendations by economists. The economists approve of soy beans, because they are an efficient crop, and in the Orient, are often the only substitute for meat. But there is a peculiar flavor to soy beans which has made it difficult to introduce them to the American people. Hiding the taste by blending has made it possible to use some as a salad oil while another portion went into mayonnaise and another as paint.

Chemical research is now going on in this field to discover new methods of utilization, one being the present attempt to make artificial egg yolk products which could be used as a food. Meanwhile, the makers of plastics are developing new uses for the bean pulp in addition to the gear-shift knobs which first made this material known. And in spite of difficulties in the fields mentioned, soy beans are a new industry—one which makes direct use of farm products.

TEMPERED GLASS

Clear glass which can be dropped on a concrete floor from a height of more than ten feet without showing a scratch or crack is finding increasing uses in industry. Already tried as a complete radio cabinet and for the body of a service-station gasoline pump, this surprisingly strong glass is made by a method which is the antithesis of the accepted method of glass making.

Rapid cooling of glass from 1,500° F. would naturally be expected to give strained pieces which would easily shatter. Though the very rapid surface cooling and contraction do cause strains, they are controlled in direction so as to be symmetrical.

One result of this tempered cooling is that the glass, when it does break, forms rounded pieces instead of sharp splinters. A force thirteen times as great as that required to break ordinary glass is necessary to break this tempered product. It is admirably adapted for industrial goggles, but could also be used for spectacles in which it would serve not only as the lenses, but because of its strength, as the frame also.

Resistance to heat is another valuable property of the glass so that large windows could be used in furnace doors and thermal instruments as it withstands the thermal shock when boiling lead is poured upon it. Its further ability to withstand bending and twisting make applications of this new material obvious in many fields.

To widen your life without deepening it, is only to weaken it.

Reflect upon your present blessings, of which every man has many; not upon your past misfortunes, of which all men have some.

—Dickens.

Measurement of Airplane Landing Speed

By Ralph L. Cram

(From *S. A. E. Journal*, June, 1935)

Various means of measuring landing speeds have been used in trying to develop an accurate method. Recently a method has been successfully developed for measuring the landing speed of Boeing airplanes.

The equipment used consists of a 35 mm. moving picture camera, a large grid, and an anemometer. The corners must be carefully calibrated to obtain the exact number of exposures that it makes per second. This was done by photographing the pendulum of a clock for several seconds.

The camera is set up at the edge of the airport on a tripod. The grid is placed exactly 10 feet in front of the center of the camera lens, and out on the runway 400 feet in front of the lens, strips of cloth

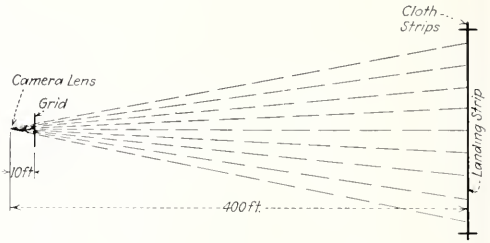


Fig. 1

are laid on the field to indicate to the pilot where the airplane must land. As the airplane comes in for the landing, pictures are taken just before the wheels touch the ground and until airplane has passed out of the range of the camera. At the time of each landing the wind speed is measured with the anemometer and the spot on the landing strip where the wheels touch the ground is noted and recorded in a notebook. The wires on the grid through which the photographs are made are spaced 6 inches apart. The distance on the landing strip which each wire represents, is equal to the wire spacing on the grid multiplied by the distance from the camera to the landing strip divided by the distance from the camera to the grid.

A typical exposure is shown in Fig. 1. There will be 20 to 30 exposures while the airplane is crossing the full width of the grid. Each exposure shows the airplane has traveled forward a certain number of feet, and knowing the number of exposures per second it is a simple matter to calculate the ground speed of the airplane just as the wheels touch the runway.

Ground speed (ft./sec.) = feet traveled/exposure, times the number of exposures per second.

The landing speed to be determined is really air speed, as the landing may have been made against a wind. The wind speed which was measured at the time of landing is added to the ground speed.

Professional Recognition

Unity in the approach to the problem of establishing adequate means for recognizing the engineer as a professional man, is emphasized in the 1935 annual report of the Committee on Professional Recognition of the Engineers' Council for Professional Development, soon to be available in printed form, which attempts to clarify its position on the three avenues toward recognition that now exist—the legal sanction by professional registration, the professional degree of the engineering school, and admission to membership in one of the major engineering societies.

The engineering schools provide limited recognition through varied processes of granting the professional degree. A second avenue is admission to the corporate membership of the large engineering societies. The only avenue for recognition having legal sanction is through professional registration. ECPD constitutes a deliberative and advisory body, the effort of which is to be influential in harmonizing the standards of these several agencies and bringing about a generally accepted concept of what may be termed the recognition of an engineer.

The objective such as is emphasized by ECPD admittedly is not immediately attainable. Before it can be established, certain basic elements should receive attention and be determined. These elements are: first, a program of post-collegiate training with emphasis upon the cultural and social aspects of the engineer's life as well as his training and experience in pure technique; second, the development of a standard by which to measure this post-collegiate attainment which will be adopted without further material question by the universities, by the boards of engineering examiners throughout the United States and by the engineering societies.

The report emphasizes the fact that the registration of engineers is an important agency of recognition because it legally sets the standard for admission to the practice of the profession. Registration is operative in some form in 35 states, and thus an agency not only is but must be acknowledged as established through which the professional status of an engineer will be recognized by himself, by the profession, and by the public. Furthermore, the registration is, for the engineer himself, of practical value, since it provides protection from those who would practice without qualification. It also provides prima facie evidence of individual capacity. However, it is pointed out that registration of engineers, as it exists in the various states is not as yet sufficiently uniform to be fully satisfactory, as an analysis of the provisions of those state registration laws appended to the report clearly indicates.

The registration of engineers is an important element in this unified approach toward the establishment of adequate means for recognizing the engineer as a professional man.

The Book Shelf

Art and Industry

By Herbert Read
Harcourt, Brace and Co., 1935

A statement to the effect that we have not yet entered the Machine Age would probably be disputed by the great majority of people. However, if we consider the fact that although the machine is with us we have not learned to assimilate it, the truth in the above is immediately evident.

Mr. Read sets forth this indictment of our contemporary life in "Art and Industry," his latest book.

We are at the present time, claims the author, in a period which is purely transitional. The machine is a product of tomorrow, but in imposing on it the aesthetic values and standards of yesterday we have produced for today a mass of inefficiency, irrelevancy, and costliness. We cannot change the machine to fit the aesthetic standards of handicraft, but we must think out new aesthetic standards for the new methods of production.

This is the problem which the book states and which it attempts to simplify and, if possible, to solve. The latter is very difficult, because it is very hard to look at one's own environment in perspective. Very clearly written and excellently illustrated, this is probably the finest book so far on this rapidly growing subject of study.

The Principles of Physical Metallurgy

By G. E. Doan
McGraw-Hill 1935

Unlike most books published on the subject of metallurgy, this one by Mr. Doan considers the principles of metallic behavior more important than the individual alloys or processes, however vital these might be industrially. The specific examples discussed in several parts of the book are presented, not as ends in themselves, but as illustrations of general principles. All these scattered references for each metal are summarized in the final chapter to make clear "the application of principle to practice."

The entire picture of the physical aspects of metal technology—properties, constitution, structure, shaping, treating, testing, etc.—stands quite complete and rounded, and is an answer to the long-standing demands of both students and engineers for one in which "extractive metallurgy" is not the chief consideration.

I heard the bells on Christmas Day
Their old familiar carols play,
And wild and sweet the words repeat
Of PEACE on earth, GOOD WILL to men.
—Longfellow.

(Continued from page 5)

half of the degrees of a circle. The upright shaft is held in place by guy cables, stiffened by turn buckles. A graduated steel boom, over forty feet in length is connected to the shaft. This can be seen clearly in the photograph. Attached to this boom is a mercury loaded plumb bob. The boom swings horizontally through a graduated arc of 180 degrees and the plumb bob may be suspended from any point upon it. This machine is called a pointing machine. A similar machine is made to the scale of the working model.

The first step in accurately carving the figure is to locate in the stone a point for the tip of the nose, because this is the extreme projection on the face. To do this the sculptor goes to the working model, drops the plumb bob down until it touches the extreme point of the model's nose. The horizontal, vertical, and angular position of this point with respect to the center point are recorded. These measurements are changed from inches to feet and transferred to the pointing machine on the stone mountain. Then by adjusting the plumb bob to correspond to the readings already taken, it is possible to determine just how much stone should be cut. In this manner, points can be determined on the mountain to correspond to any point on the working model.

Dynamite Replaces Chisel

The carving of the monument consists in excavating the excess rock by a drilling and blasting process which removes successive thin layers of granite in such a manner as not to injure the rock. This process proceeds to within a few inches of the final surface, and then the finishing is done by a broaching process. The broken rock falls over the face of the cliff and requires no equipment for transportation.

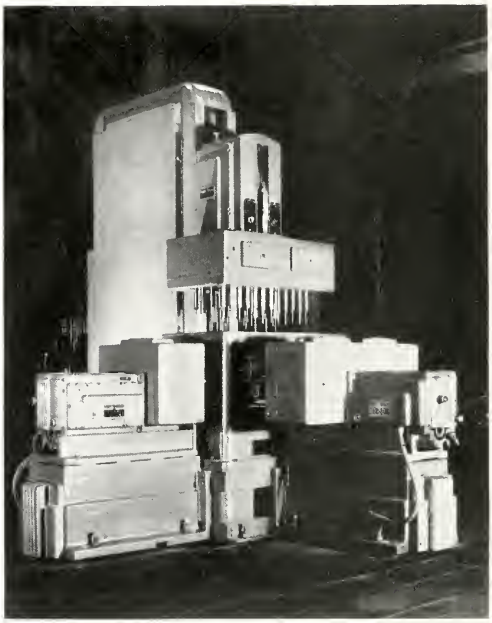
There are ten Ingersoll-Rand "R-12 Jackhammer" drills on the job. When in use, they are attached by chains to the same cables which hold the drillers. Seven-eighth-inch hollow drill steels finished with cross bits are employed. On the head of Jefferson, the drill holes average from 10 to 12 inches deep, are about three inches apart, and are set about one-half foot back from the face. About three-quarters of an inch in length of a seven-eighth-inch stick of special gelatin dynamite is used in each hole. The explosive unit is lowered into the hole and tamped with damp sand until the hole is about two-thirds full. The cap wires from about 60 to 70 holes are connected together and fired simultaneously by means of a 110-volt power circuit. When blasting has brought the face of the cliff to within three or four inches of the final surface, another procedure is employed for finishing.

Washington Grown Up

The finished head of Washington measures sixty feet from the crown of the head to the tip of the chin. This is in proportion to a man 465 feet high. When we realize that the figure is seven thousand feet above sea level, the importance of the National Memorial as an engineering feat is clearly understood.

(Continued from page 7)

carry on several operations at once. An automatic screw machine may have eight spindles mounted at



Modern Multiple Action Machine

fixed equidistant points on the circumference of a circular frame. Each spindle has an operation of its own, and the table rotates through the proper angle at the completion of one operation, bringing a new piece of stock to each spindle.

There was shown an hydraulic press which stamps out automobile crankcases under a force of 400 tons. At the other extreme is the surface broacher, displacing the milling machine in cutting down surfaces of pieces of not too great size. Surface broaching, using a broad saw-toothed tool, is a recently popularized process which gives a faster and less expensive job than the displaced milling machine.

Since invitations to the show are issued only to those connected with the industry, the 900 machines, representing some $3,000,000, were not accessible to the general public. The technical improvements which they embody will make for better automobiles, refrigerators, and other products which are necessities in present day life. The 1935 Machine Tool Show represents an achievement in engineering and applied mathematics of which the technical world may be justly proud.

[*Ed. Note: The material in this article is taken from notes of Dr. Rufus Oldenburger and Dr. Wm. A. Pearl, instructors at Armour Institute of Technology, who were visitors at the convention.*]

AS I WAS THINKING

Recently I was talking to one of our students about his prospects for a job after graduation. He was uncertain whether he should seek employment with a large concern or a small one, for he recognized certain advantages in each. However, he expressed his chief concern about the whole problem when he said: "I am a bit afraid of company politics, which might be worse in the big organization."

Consider the politician for a moment. Watch him in a campaign and see how he glad-hands the men, flatters the women, and kisses the babies, much to the latter's disgust. In his more candid moments he gives thanks that the babies can't vote. He is simply being as agreeable as he can, striving to make friends, in the hope that friendships will blossom into votes. In short, he is practicing the fine art of human relations, and often it prevails against a sounder opponent who deals in facts and figures.

After election the politician often double-crosses his new-found friends and sells them down the river. But this only affords another opportunity for the practice of his art, for he'll do it all over again next time.

I wonder if many of us couldn't find something in the politician's bag of tricks that we could use to advantage. Whether you are part of a large organization or a small one, you must work with others, and if you have mastered the difficult art of human relations you will find the job much easier. If you have made friends in your organization, both below and above you, I fancy that company politics will be with you more often than against you.

JAMES C. PEEBLES, 04.

WHO'S WHO

From the land of mesquite and blazing sunsets, came P. WILSON EVANS, after a year at the University of Texas, to the City of Chicago and Armour Institute of Technology. Wise beyond his years, or with his wits about him, he made his way through college by serving the said city, and also the Sanitary District, as a substation operator. In college he was a member of Delta Tau Delta, Tau

Beta Pi, Eta Kappa Nu, and Sphinx; and he was editor of the senior class book of 1912.

From Armour Institute he walked into the engineering department of Armour & Company, where he specialized in refrigeration. That was in 1912. Then came the war, and the need for P. Wilson Evans. A committee, representing the principal packers, recommended him to the War Department. And from that time until the Armistice, he was in charge of the design, construction, and operation of the various cold storage projects undertaken by the A. E. F. in France. Because of his ability, he attained the rank of Lieutenant-Colonel.

Returning to Armour & Company after the war, he devoted his attention to boiler room operation; and in 1926 he patented the use of sodium aluminate in connection with feedwater treatment. This work led up to his present position as Vice President of the National Aluminate Corporation, a concern affiliated with the Aluminum Company of America, whose principal business is the sale of sodium aluminate for use in connection with water treatment, manufacture of high temperature refractories, sugar manufacture, and other specialized uses.

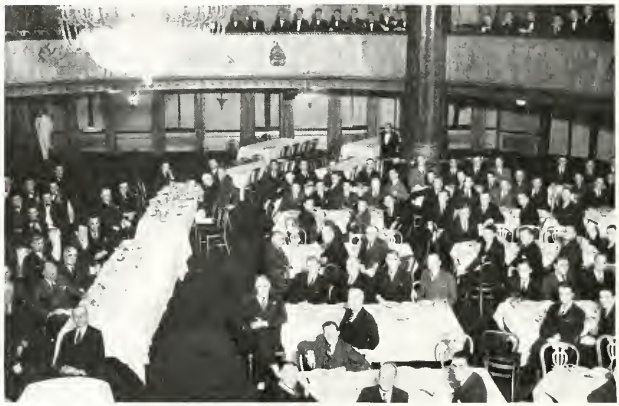
The Evanses live in Hinsdale, Illinois, have three children, Dick, Dot, and Ann, ranging from seven to two. As an ardent pistol shot, Mr. Evans is a member of numerous shooting organizations. In 1919, he was on the winning U. S. team in the Inter-Allied Pistol Match held at Le Mans, France.

ALUMNI NOTES

Because of the difficulties encountered in getting out our new magazine, the first issue was a month late, and therefore dated October-November. But this will not happen again, if we can help it. The December issue is out on time, and will come to you a few days before Santa arrives. We wish you all a Merry Christmas and a Happy New Year.

●

Do not fail to read John Schommer's article on the Armour Tech Relays, nor to make note of the date on your calendar.



Banquet of November 12

Of the 3,000 copies mailed out to the alumni whose addresses we have on file, about 100 were returned. This is an unfortunate waste, since we must pay not only the original postage but a return as well. Will you therefore please notify us of any change, giving us both your home and business addresses and designating the one to which you wish the magazine sent.

●

Modesty compels us to conceal the compliments received on the first issue, but we are grateful to all who sent letters. We realize only too well that there is room for improvement, and you will observe what has been done in this present issue to make it more attractive. In subsequent issues we hope that this will be even more noticeable.

●

Please be reminded that we are constantly in need of news of you, and that we will appreciate a card or a letter, or an article on a subject of common interest. We shall try to make the *Alumni Notes* and the (*Letter Box*) of even greater interest, but we must depend on you for the materials. Send them to the Editor, 3300 Federal Street, Chicago.

●

The March issue will contain complete information about the Spring Alumni banquet. We ought to begin thinking about it and talking about it now, so that we may have at least a thousand in attendance.

●

We are happy to include in this issue a summary of the President's annual report. If you care to have a complete copy, please fill out the blank inserted for your convenience.

●

Too often we think that the only way we can help our Alma Mater is financially. While this is one of the most important, there are many other ways—ways in which all of us can be of great service. The first semester is nearing the end. The second semester commences February 10. Why not talk about your college, why not

advertise it to young men looking for our particular type of school? The writer of this article had occasion to mention the Institute to an old friend and schoolmate of his who had a son interested in engineering education. The ten minutes spent together on a street corner last May resulted in a fine new addition to the student body in September. Opportunities are all about us. All that you may need to do is to speak up. Send for a catalog if necessary and see what the college has to offer. Interesting new courses are being added; the evening school is approaching an old record and soon will surpass it (see Dean Heald's article and the Institute advertisement, in this issue); and graduate courses, both day and evening, are being offered for advanced degrees.

•

1897

Wm. F. Sims is enjoying the best of health and very active in carrying on the work of electrical engineer for the Commonwealth Edison Company of Chicago. A more complete story at a future date.

1898

Harry A. MacClyment resides at 516 Seaton Street, Los Angeles, Cal.

1899

Ray S. Huey is with the Universal Atlas Cement Company, Morgan Park Station, Duluth, Minn.

Louis F. Mahlers lives at 39 Brentmoor Park, St. Louis, Mo. Sorry to learn that you are not in the best of health.

1902

L. C. Austin, Williamson, Wayne County, N. Y., sends greetings to all.

1903

Eugene R. Weber is with the Bucyrus-Erie Company at South Milwaukee, Wis.

1904

Augustus W. Jackson informs us there is an iron works in Los Angeles bearing his name.

1905

W. F. Parker is president of the Standard Transformer Company at Warren, Ohio.

1906

Orrin T. Allen is assistant manager of sales for the American Steel and Wire Company, Chicago.

Franklin Wanner is in the real estate business with offices at 19 So. La Salle St., Chicago.

1907

FRED G. HENCHLING is now located at 122 So. Michigan Ave., Chicago, operating the Assured Investment Company.

1908

ROY GEORGE GRANT is with the General Electric Company and handles commercial refrigerators. He is located at 478 W. Canfield Ave., Detroit, Mich.

PAUL JAMES PAHLMAN is a drawing instructor at Tilden Tech high school, Chicago.

1909

HALLAM C. SMITH is assistant works manager for the Linde Air Products Co..

Clear across the country we reach T. W. SIMPSON, of Portland, Ore., He is the Northwest district manager of the James Graham Mfg. Co., of Chicago.

1910

HERBERT SPRECHER GRENOBLE is director of the Richmond branch of the Virginia Polytechnic Institute at 10th and Marshall Sts., Richmond, Va.

1911

CHARLES HENRY MARX is engineering designer for the water department of the City of Milwaukee.

1912

RUFUS S. CLAAR is real estate and land commissioner for the Soo Line, and is located at Minneapolis, Minn.

1913

DAN M. STUMP is teaching in the Austin High School, Chicago.

1914

ARTHUR A. HEEREN is construction manager, Engineering Sales Division of the U. S. Gypsum Co.

1915

CLAUDE ALBERT KNUEPFER is president and general manager of the General Engineering Works, 4701 W. Divison St., Chicago.

1916

And from New York comes word from A. GRASSE that he is an assistant secretary of the Home Insurance Company. His hobbies are golf and gardening.

1917

T. E. BOTTS is a tire development engineer at the U. S. Rubber Products Corporation in Detroit, Mich.

1918

ALEX A. HOFGREN is actively engaged as a patent lawyer, at 105 W. Adams St., Chicago.

1919

J. H. Markham has the position of chief chemist with the Grand Rapids Varnish Corporation of Michigan. His hobbies are chiefly tennis, chess, and stamps.

1920

Arthur L. Lyon is a graduate master brewer and is now with the Wahl Henius Institute, Chicago.

1922

David S. Jennings is vice president of the Central Screw Co. at 3501 Shields Ave., Chicago.

1923

Roy P. Jensen is production engineer for the Royal-Liverpool Insurance Co. with his office at 2341 National Bank Bldg., Detroit.

1924

From R. A. Skriba comes word that he is the chief designer for the F. J. Littell Machine Company of Chicago.

E. W. Husemann is employed by the Republic Steel Corporation of Chicago, for whom he is a metallurgist. He likes all sports, and his hobbies are music, dogs, and last but far from least, his family, of wife and two fine children.

P. A. Bennett is living in Blue Island, Ill. He is employed by the Public Service Company of Northern Illinois, is married, and the father of three children.

1921

J. P. Sanger is employed by the U. S. Gypsum Company, for whom he is the director of purchases. He is president of the Purchasing Agents Association of Chicago, and is also active in several other organizations.

1926

L. J. Lowden, is a district representative of the Sterling Pump Corporation, Chicago.

B. H. Schenk is employed as an area supervisor for the Visking Corporation, makers of synthetic sausage casings.

1925

L. S. Green is a fire insurance inspector for the Missouri Inspection Bureau at Kansas City, Mo.

1926

From Wilmette we hear from H. J. Prebensen. He is vice president of the Air Comfort Corporation and Air Conditioning Engineers' & Contractors, in Chicago.

1927

M. Lovejoy is now employed at the Hawthorne plant of the Western Electric Company, in Chicago, as a

chemist in the analytical laboratories. He has one son.

C. W. Price is employed at the Kansas Inspection Bureau at Independence. He is married and has one son.

G. Lukey is working for the Public Service Company of Northern Illinois. He is the father of two children.

1928

L. J. Anderson is with the RCA Manufacturing Company, New Jersey.

N. Cottington is an engineer for the Michigan Inspection Bureau at Detroit. His favorite sports are handball and boating.

1929

H. H. Dozois is working with the Illinois Bell Telephone Company. His hobbies are amateur radio, photography, gardening, and his little daughter.

M. B. Golber is employed in the industrial engineering department of Armour and Company, Chicago.

A. J. Stabovitz says he's just a B.S. trying to get along. He says he's married but has no children—yet.

J. E. Wack is in the development and research department of the Teletype Corporation, Chicago.

1930

R. B. Swanson is now with the Underwriters Inspection Bureau and is rating fire insurance. He is the proud father of two boys.

H. W. Montgomery is at the Illinois Inspection Bureau at East St. Louis, Ill. His hobbies are stamp collecting and tennis. His son is now eighteen months old.

1931

D. M. Fetterman is employed by Wells-Gardner & Company, Chicago.

O. J. Fiala is working for Durkee Famous Foods Company, Chicago. He is also an active member of the American Oil Chemists' Society.

K. C. Langhammer is at the Indiana Inspection Bureau, Indianapolis, Ind.

M. E. Lukey is with the Public Service Company of Northern Illinois, at Chicago. He is married and has two children.

W. A. Schrader is a radio engineer in Communications Laboratory of the United Airlines Transport Corporation.

C. J. Stamberg is working for the North Shore Coke & Chemical Company of Waukegan. He lives in Cicero, Ill.

E. A. Olson is employed by the Pullman Standard Car Mfg. Company.

1932

H. Hamlin is now a customer service man for the International Business Machine Corporation.

Since March, 1935, E. J. Wiltrakis has been with the U. S. Forest Service on the Plains Shelterbelt Project, and he says that he will be glad to answer questions regarding the project.

W. S. Guyot is now with the Silvercote Products, Inc., Kalamazoo, Mich.

S. L. Otto is in the book-keeping department of the brokerage firm of Winthrop Mitchell & Company, Chicago. His hobby is golf.

J. Palma, Jr., is living in Berwyn and is employed by Montgomery Ward and Company as an industrial designer.

Congratulations to Stanley Lind, who was married on November 30 to Miss Hermine Schurman at Pekin, Ill.

1933

W. J. Weldon is a golfer and bowler with a high amateur standing. He has been very active in his church affairs.

1934

And from Bill Hoyer comes word that he is with the General American Tank Car Corporation of East Chicago, Ind. He is also studying metallurgy in Armour's evening classes. Can't stay away, Bill, eh?

F. C. Noerenberg is now employed as a chemist for the Olson Rug Company, Chicago. He isn't married yet, *but* we know of someone in Milwaukee he has his eye on. How about it, Fred?

D. J. Mullane got homesick for dear old Armour so he came back to earn a Master's Degree which he received a year later. His hobbies are bridge and *phony* card tricks. He does his practicing on the Armour boys.

1935

And Dan Cupid scores another hit as we note with interest that Lester Kerlin was married December 14, 1935. Congratulations, Les.

R. D. Armsbury is now employed by the Shell Petroleum Corporation. He is not married as yet.

LETTER BOX

Melbourne, Australia,
October 8th, 1935.

The Armour Engineer and Alumnus.

Gentlemen:

I shall be most pleased to receive copies of the *Armour Engineer and Alumnus*. Such friendly and familiar publications from the Alma Mater will be very acceptable out here "Way down under" the Southern Cross.

But to answer the questionnaire:

(1) *My work*

In 1934 I was transferred to the Export Dept. of the Ethyl Gasoline Corporation, which I still represent as Australasian manager. Our task has been to introduce ethyl and heat-treated petrols into this section of the world. We have made good progress and our customers control more than half the entire petrol gallonage. (It's *too* long a story.)

(2) *My hobbies*

Travelling used to be a hobby of mine, but after five or six years . . . it loses that virtue. Nevertheless, it's still terribly interesting.

Golf and swimming are my real sporting hobbies. Swimming, or ocean surfing, becomes very sporty and thrilling, considering the number of sharks.

(3) *My family*

Unmarried—and separated by roughly 11,000 miles from my parents.

(4) *Unusual experiences*

Nothing outside of visiting strange countries.

Accomplishment

Just getting along on 3 meals a day (so to speak). Roosevelt is still President, isn't he?

(5) My one great personal interest just now is a five months' vacation I plan to take next year. U. S. A. will look pretty good in spite of N. R. A., W. C. T. U., B. S. A., or what have you.

Best regards to all.

Cordially yours,
ALAN C. TULLY, '28.

December 8, 1935.

Dear Editor:

The Mechanical Engineers of the Class of 1935 formed a club, while at Armour, which as yet has no name, due only to the fact that some of the members have not as yet graduated.

These men met the evening of November 22 to renew their pledge of lasting friendship and mutual aid to help each other to plant their feet and make a name for themselves in the industrial field.

Twenty-four men were present at the meeting. Two men are now working out of state and have left us for a short while. The absence of only one man was unaccounted for.

Naturally, the greater part of the evening was spent relating the various experiences which the men had encountered during the past five months.

The evening was well enjoyed with movies, cards, sandwiches and roulette with the aid of "phoney money." Incidentally, the bank was broken no less than three times by the big gamblers.

Yours very truly,
H. L. MAYEROWIZ.

November 18, 1935.

I ran across the enclosed in going through some old photographs. It was taken in Zurich, in 1928, near the end of a perfect luncheon given by Dr. and Mrs. Monin to Mrs. Henderson and me.

He had proposed a toast to the success of the Institute, which was his great concern, second only to his anxiety for the welfare of his wife after his passing, which he then knew to be only a matter of perhaps a year.

Alfred Alschuler and his wife were in Zurich at the same time; and we all had another dinner with the Monins at one of

A Toast to Armour

his haunts of his student days, fifty years previous. It was during this visit that Mr. Alschuler and I determined to take the responsibility of assuring Dr. Monin that "his boys" would not allow Mrs. Monin to come to want. Since his death, this assurance has been made good by 39 Armour alumni, the widow of another, and three outside friends. The gift of these men were free will offerings of appreciation for their richer lives, made so by Dr. Monin. It is happy and satisfying news that comes from her now that she is engaged, and awaits only a better business situation for her fiancé to permit their early marriage. I hope that before another issue of the *Armour Engineer and Alumnus* goes to press we may have confirmation of our hopes for her marriage and a happy period to succeed the one of dread and hardship since our beloved Dr. Monin was taken from her.

Perhaps you would like to use this as a basis for a little reminiscence concerning Dr. Monin in the next issue. If I get word about the marriage, I'll advise you at once.

Sincerely,
ROY M. HENDERSON.

Westcliff, Essex, England,
October 21, 1935.

Armour Engineer and Alumnus

My wife and I are quite content here in England, although it has taken the better part of the six months here to become accustomed to the people, their speech (it's surprising how different the English language can sound), their ways, and their modes of living, and particularly the climate, which is a variable of sudden changes made quite offensive by the almost utter lack of centrally heated homes. All in all, England is very much like the U. S. A. in most respects, but it's some of these little things that go to make life agreeable or disagreeable.

In regard to my position over here with E. K. Cole in their research department, I can say that I have been treated exceptionally fine. I have been doing short wave radio development work, and have had very much of an open hand. Recently upon completing the design of a special short-wave receiver for tropical usage, I had the opportunity of making a marvellous trip. Most of the trip was made by plane and train, about 2,700 miles by each, while one short jump of 200 miles was made by boat on the beautiful Mediterranean. On this trip, made particularly for securing engineering data but also for sales and pub-

licity, I visited Alexandria, Cairo, Tel Aviv, Athens, Milan, and Paris.

HARRY C. ROWE, JR.

Hoboken, N. J.
December 4, 1935.

Dear Mr. Editor:

We have looked through the October-November, 1935, issue of the *Armour Engineer and Alumnus* about eleven times to find your name so that we might congratulate you on your achievement.

It's great, absolutely great, to see several of the old familiar faces again, and "Meet Our Trustees" almost face to face.

I'll never forget the time I sat in the Armour Mission and listened to good old John Schommer invite the assembly of new freshmen to the Institute. I think this talk was the pinnacle of John's success as an orator, since he seemed hot under the collar as he concluded that the coming four years would be four years of Hell for us. I say I'll never forget the occasion because I was sitting in the front seat and couldn't hide behind the fellow in front of me.

It was extremely interesting to read Harry Nachman's article on the destruction of the Century of Progress. In a way it was rather depressing to me, because I saw them build the World's Fair in Chicago, and was in charge of a Booth for the General Electric Company in 1933. It was an inspiration to see the enormous plain buildings in their stage of erection, and now Mr. Nachman tears them down, and the Century of Progress is just a memory.

President Hotchkiss reminds those of us who have been in the Engineering field for the past few years that English and Grammar are highly important in our every day activities. Good English makes a Good Engineer. We were taught to understand this when we first entered Armour, but discovered four years after leaving Armour, that it was actually true.

A word from the Dean is a word from the Wise. When I attended Armour, the Beloved Dean Morin called me into the office where Dean Heald now sits, and made me feel like one-tenth of 1 per cent for chewing gum at a President's Reception in the presence of a very demure and charming young lady—the girl I later married. In those days I was on the job, just like the Engineer on page 17. Today, I am still on the job, but in a bigger way, since my family has increased to three. In other words I have two little girls; there being, however, no intentions of running Eddie Cantor a race for honors.

What do you mean we are going to find out which school is best? Everyone knows its the Armour Institute of Technology.

Now we'll "can" the chatter and offer our assistance in any way possible to make the *Armour Engineer and Alumnus* a high-grade publication. If you can think of anything in particular that we may do, kindly do not hesitate to call upon us. Perhaps you would like an article on the new highly efficient High Intensity Mercury Vapor Lamp. This new lamp is taking the country by storm. I have had much to do with its commercial release and other factors pertaining to its field application.

Before my association with the General Electric Vapor Lamp Company, I was connected with the G. & W. Electric Specialty Company (Chicago) in charge of the Underground Distribution Box Department. My present position is in the Commercial Engineering Department in charge of Industrial Lighting. We moved out here in 1934, and recommend the East very highly. Our home is at 44 Oakridge Road, West Orange, New Jersey. I should be glad to hear from you in a business or personal way at any time. This also applies to the boys I used to know and all that I may not know.

Kindly extend my best regards to the faculty, alumni organization, and student body.

Cordially yours,
George J. Taylor.

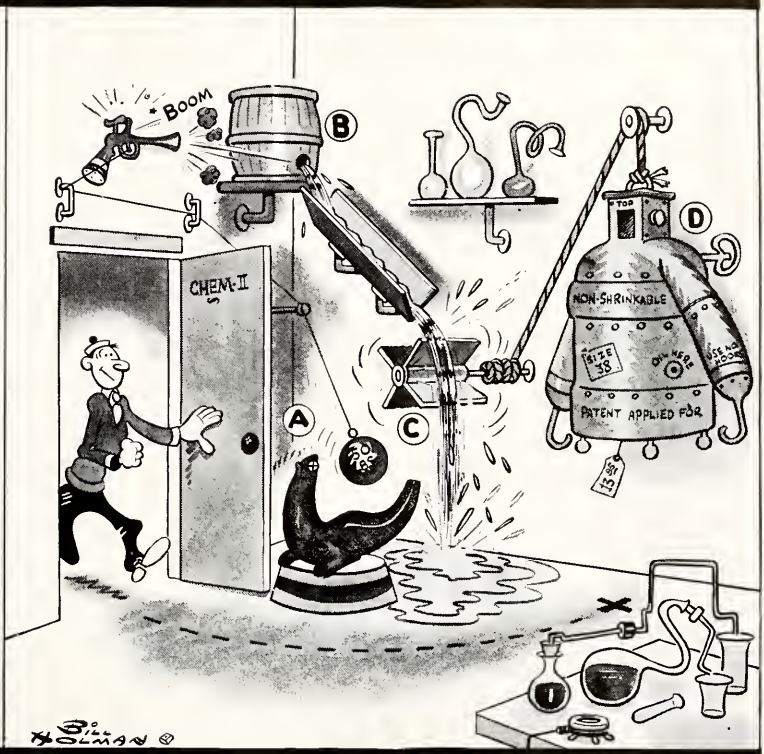
Better be with a few who are right, than with many who are wrong.

—Jarvis H. Wood.

He is richest who enriches mankind the most.

EASY WAY TO STUDY CHEMISTRY SAFELY

STUDENT OPENS LABORATORY DOOR CAUSING TRAINED SEAL (A) TO DROP BALL — FIRING PISTOL AND PUNCTURING BARREL (B). WATER RUNS DOWN TROUGH ON TO WATER WHEEL (C) WHICH TURNS AND LOWERS ARMOR-PLATED SUIT (D) OVER STUDENT SO HE CAN PERFORM EXPERIMENTS IN SAFETY. IF THIS DOESN'T WORK DIVE OUT NEAREST WINDOW —



... AND AN EASY WAY TO ENJOY A PIPE

I WANTED MILDNESS AND REAL FLAVOR— FOUND 'EM BOTH IN PRINCE ALBERT

THE BIG 2 OUNCE RED TIN

MEN PREFER THAT P.A. FLAVOR!

PRINCE ALBERT IS RICHER — YET SMOOTHER AND MILDER. ALL "BITE" IS REMOVED. IT'S "CRIMP CUT" FOR SLOW BURNING. AROUND 50 PIPEFULS IN EVERY 2-OUNCE TIN. NO WONDER MORE MEN SMOKE P.A. THAN ANY OTHER BRAND!

PRINCE ALBERT

THE NATIONAL JOY SMOKE!

SEASON'S GREETINGS

FROM
R·J·REYNOLDS TOBACCO COMPANY
MAKERS OF CAMEL CIGARETTES AND
PRINCE ALBERT SMOKING TOBACCO

Camels

Of course you'll give cigarettes for Christmas. They're such an *acceptable* gift—such an easy solution of your problem. And Camels fill the bill so perfectly. They're made from finer, MORE EXPENSIVE TOBACCOS than any other popular brand. They are the accepted cigarette of the social, business, and athletic worlds. Their finer tobaccos give that pleasant "lift"—that sense of well-being so appropriate to the spirit of Christmas.

A Christmas special—4 boxes of Camels in "flat fifties"—in a gay package.

At your nearest dealer's—the Camel carton—10 packs of "20's"—200 cigarettes.

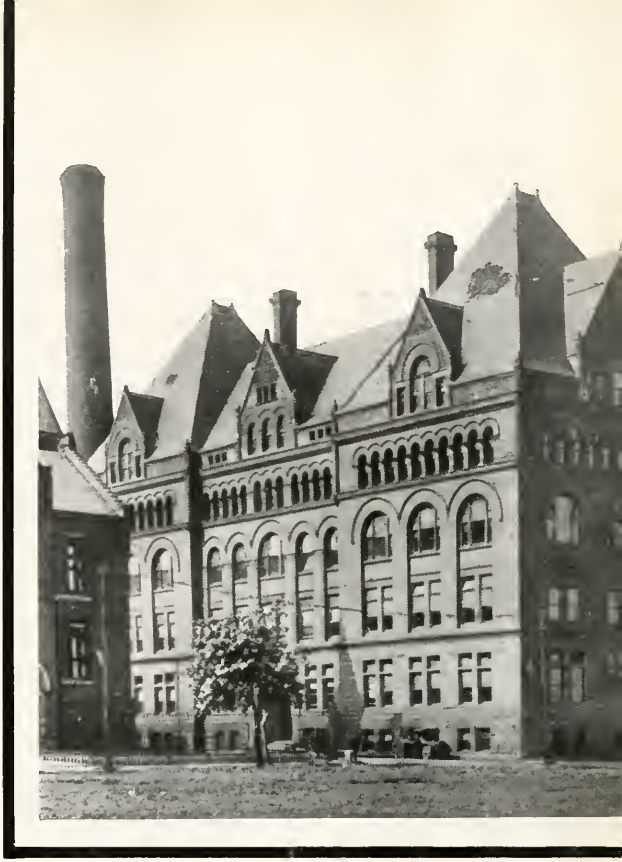
A full pound of Prince Albert in an attractive gift package.

A full pound of Prince Albert packed in a real glass humidor.

Prince Albert

Fine tobacco for Christmas. For more than a quarter of a century, the mellow fragrance of Prince Albert has been as much a part of Christmas as mistletoe and holly. So to the pipe smokers on your Christmas list give Prince Albert, "The National Joy Smoke." It's the *welcome* gift. For more men choose Prince Albert for *themselves* than any other pipe tobacco. Let every pipeful of Prince Albert repeat "Merry Christmas" for you.

MARCH
1936



Armour ENGINEER

and Alumnus

WITCO

WITCO STEARATES

OK'd by the most exacting buyers

Severe tests insure the uniformity of Witco Stearates . . . and as a result they have earned the confidence of many of the country's most exacting buyers. Witco Stearates are steadily growing in popularity. Their use will convince you that they are not only of the highest quality but that the quality is unvarying. Write us to arrange for trials.

HAVE YOU HEARD ABOUT STEARITE?

A new and highly efficient stearic acid produced by the selective hydrogen process which assures greater uniformity . . . closer control over the ratio of fatty acids present. Let us show you how Stearite will enable you to lower your costs and improve your production at the same time. May we send you samples and full information about its use?

WISHNICK-TUMPEER, INC.

MANUFACTURERS AND IMPORTERS

CHICAGO, 365 E. ILLINOIS STREET — NEW YORK, 295 MADISON AVENUE

BOSTON, 141 MILK STREET — CLEVELAND, 616 ST. CLAIR AVENUE N. E.

WITCO LTD., BUSH HOUSE, LONDON, W. C. 2, ENGLAND

BUY DIRECT AND PROFIT DIRECTLY

WITCO OWNED AND OPERATED: THE PIONEER ASPHALT CO. and the PANHANDLE CARBON CO.

G-E *Campus News*

LET SCIENCE ARBITRATE

In heated arguments of this kind, the color analyzer is the court of last resort. Recording photoelectric spectrophotometer is the official name of this device, which was recently exhibited at a scientific meeting at St. Louis. It recognizes an infinite variety of hues and shades; it distinguishes differences in color too slight for human eyes to detect; it automatically records the exact color prescription.

The spectrophotometer is proving especially useful for standardizing the color specifications of inks, dyes, paints, paper, and textiles. It makes obsolete such vague descriptive names as blue-black, blue-white, and yellow-green, and substitutes carefully drawn graphs extending over the whole visible spectrum. The operation of the device, which is automatic, depends upon an ingenious combination of a phototube and thyratron tubes with a precise optical system.

The previous method of making exact color measurements required hundreds of tiresome readings and consumed most of a day. The recording spectrophotometer produces a curve of comparable accuracy in three minutes.

DIG HERE

In the old days, a mysterious individual, called a dowser, with a forked devining rod of witch hazel, used to be called in to locate lost articles buried in the earth. A new magnetic detector, recently developed in the General Engineering Laboratory of the General Electric Company, is now substituting science for magic and hocus-pocus. With uncanny accuracy, it is tracking down lost pipe lines.

Water and gas pipes are often lost because old surveys are inaccurate or because records have been destroyed. Digging up a whole street, in order to find a missing pipe line, is expensive business. The new detector has solved this problem by successfully locating pipes laid 40 years ago—pipes buried as much as seven feet below the surface. In one case, pipes were found fully 100 feet from their supposed location, and the detector spotted them within one diameter of the pipe.

NEW LIGHT ON THE MIDDLE AGES

Medieval ecclesiastics would cry "Witchcraft!" could they see the cathedral at Burgos, Spain, tonight. Carefully wrought details of architecture and ornamental carving, never before clearly seen in all their seven hundred years, now stand forth in bold relief. The thirteenth-century Gothic structure glows, for two hours each night, in the light of a battery of modern General Electric floodlights.

Burgos was, for centuries, the capital of Old Castile, the kingdom of that Queen Isabella who offered to pawn her jewels to finance Columbus' momentous voyage to America. Now, after 444 years, American lighting equipment returns to add luster to what was one of the most important of Isabella's possessions.

96-237DH

GENERAL ELECTRIC

Better . . because IT'S WELDED

● The modern automatic refrigerator is *better because it's welded!* Welding insures smooth, permanent units in which there is nothing to work loose—no place for germs to gather—no joints to develop leaks.

Welding has made many good products better—refrigerators, automobiles, radios, streamlined locomotives, metal furniture, and a thousand other things. You, too, may find it profitable to consider the advantages in both production and sales which can be gained for your product by jointless design-for-welding.

Linde engineers will gladly cooperate with you in the design or redesign of your products for welding. The benefit of their broad experience is available from Linde Offices located in principal cities throughout the country and at 30 East 42nd Street, New York, N. Y.

The Linde Air Products Company

Unit of Union Carbide and Carbon Corporation

UCC

LINDE OXYGEN UNION CARBIDE
PREST-O-LITE DISSOLVED ACETYLENE
OXWELD WELDING AND CUTTING APPARATUS AND SUPPLIES

ARMOUR ENGINEER and ALUMNUS

MARCH 1936

VOLUME 1 NUMBER 3

IN THIS ISSUE

Published in October, December, March, and May, in the interests of the students, college, and alumni of Armour Institute of Technology, under the direction of a Managing Board, consisting of D. N. Brissman, H. P. Dutton, W. Hendricks, D. P. Moreton, chairman, and F. X. Popper at 3300 Federal St., Chicago.

MUSEUM OF SCIENCE AND INDUSTRY

The Museum is housed in the reconstructed Fine Arts Building of the Chicago World's Fair of 1893

Museum of Science and Industry

■■■

by O. T. Kreusser, Director

THE first industrial museum to be established was the Conservatoire des Arts et Metiers in Paris in 1799. Its purpose was that of a depository for machines, tools, models, drawings, books, and originals of instruments and machines invented. Originally the use and principles of tools and machines were to be explained, but the institution has undergone many changes since its inception, with the result that today it is hardly more than a storehouse of material valuable only to the research student.

In 1853 the Science Museum, South Kensington, London, was organized as a medium through which knowledge respecting vital industries could be disseminated. This museum has had a varied existence, and today is noted primarily for its large collection of original models and machines associated with early great inventors and scientists, including Watt, Stephenson, Bessemer, and Kelvin. A third industrial museum, the Technisches Museum of Vienna, had its inception from the International Exposition held there in 1873. The museum, as such, was organized in 1908. The imperial decree which deals with its purpose as an educational institution was issued in 1909.

We have in the United States the Smithsonian Institute in Washington, founded in 1846 "for the increase and diffusion of knowledge among men," the most important of this country's institutions to house famous original machines and models.

These museums are depositories of scientific and industrial equipment and products rather than educational institutions with a definite plan for popularizing science and engineering. The Deutsches Museum of Munich, organized in 1903 by Dr. Oskar von Miller, is referred to here, since it was the first technical museum to have a defined educational program to which it has adhered since its beginning. The methods used in that museum to show the development of science and technology and to present a vivid history of the influence of invention and mechanical progress upon social life have been unusually successful. The Deutsches Museum has had an important influence on the Museum of Science and Industry. In fact, it was the insatiable interest of a fourteen year old boy in the moving machines exhibited in the Deutsches Museum in 1913 that inspired Julius Rosenwald, the founder of the Museum of Science and Industry, to make possible a similar institution in Chicago. Several years intervened before the Museum's organization in 1926, and since then much time and money have been spent in its development.

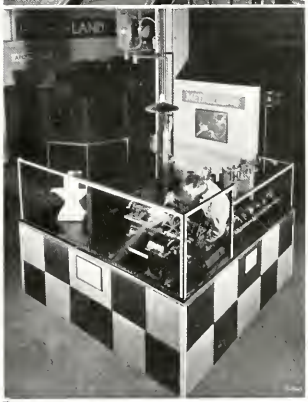
The Museum is housed in the reconstructed Fine Arts Building of the Chicago World's Fair of 1893. After the 1893 Exposition, this building was occupied by the Field Museum, but when that institution moved into its permanent home in 1920 the building deteriorated rapidly because of its temporary construction. The building, designed by Charles Atwood, had long since established itself as an architectural masterpiece, however; and public opinion, guided by prominent citizens and civic organizations, including architectural groups, was aroused. In 1924, definite action was taken to restore the building in permanent construction, and $5,000,000 was voted for the purpose. The reconstruction, which commenced in 1929, included the replacing of the footings under 10,000 lineal feet of the old brick walls, the only part of the original building that was salvaged. All stucco was removed from the walls; wood, iron trusses, and columns, all of temporary construction, were replaced by heavier materials. The stone contract involved approximately 350,000 cubic feet of Indiana limestone, weighing 28,000 tons, and included 140 exterior free-standing Ionic columns, 135 built-in columns, and several miles of carved moldings, as well as a large number of carved decorative pieces, twenty figures of which are 12 feet tall and weigh 5 tons each.

Shortly after interest had been aroused in saving the building, attention was directed toward using the structure to house the proposed industrial museum, which was then in the initial planning stage When it was finally decided to restore the building, Julius Rosenwald came forward with an offer of $3,000,000 with which to plan and develop the Museum, provided the building would be turned over to the institution when completed. When it was found that the proceeds from the original bond issue of $5,000,000 were insufficient, Mr. Rosenwald agreed to assume the remaining deficit. Reconstruction commenced in the fall of 1929, and the exterior of the building was completed in the early part of 1932.

In 1926 the Museum of Science and Industry was organized, and a board of trustees selected from the country's leading industrialists. After two years' preliminary study, a director was appointed and the organization staff developed. Since that time progress has been made in the immense task set by the founders who outlined the aims which will make the Museum of Science and Industry outstanding. Studies and research pertaining to scientific and engineering history and development, and logical methods and arrangements for presentation of material were made. Cooperative meetings with domestic and foreign industries, educational institutions, and government representatives, and the organization of cooperative committees from representative industrial groups to assist in the arrangement and selection of exhibit material have been among the duties of those associated with the institution. A large amount of historical and modern exhibit material has been collected, and much has been prepared for exhibition.

A popular library of science and engineering, an auditorium seating 1,200, a fully equipped lecture hall for 350, several smaller halls, and temporary exhibition areas are some of the many facilities which will be in constant use in carrying out the Museum's educational program.

Because of the large exhibition area, with its 9 miles of main aisles, the whole Museum has been divided into ten main sequences, each starting and terminating at this central area, making it possible to see the Museum by a series of visits without having to double back. Commencing with (1) Fundamental Sciences (including physics and chemistry) and passing in logical order through (2) Geology and Mineral Industries; (3) Agriculture, Textiles, and Forestry; (4) Motive Power (power generation, transmission, and distribution); (5) Highway Transportation; (6) Rail Transportation; (7) Water Transportation; (8) Air Transportation; (9) Graphic Arts and Communication; (10) Architecture and City Development; and finally, (11) the Medical Sciences, the



● ● ●

Typical examples of exhibits at the Museum

visitor will see the historical development and modern aspects of science, engineering and industry. The building interior will be finished in a simple design to harmonize with its contents of machinery, scientific apparatus, and the processes of industry. The general lighting will provide sufficient illumination to give a pleasing atmosphere while the individual exhibits will be provided with special lighting to bring out the details clearly.

The story of the growth of science and engineering from primitive to modern times will be told in a dramatic, but well balanced, picture of technology and economics, so that both the twelve-year-old and the experienced adult can become acquainted with the industries whose products and services are used in everyday life, as well as with those which are known only through study. Many methods will be used to make the complicated picture clear. The historical development will be told by moving machines —originals, replicas, and models. Basic principles will be demonstrated by animated units, and complicated modern processes, by charts and flow sheets, while motion pictures will be used to show the actual operation of large equipment or the manufacture of materials. Fast-moving machines will be slowed down to an intelligible speed; and chemical reactions will be visualized by animated diagrams.

The visitor will take an active part in the demonstrations wherever possible, turning cranks or pushing electric switches, while the more complicated machines and processes will be demonstrated by trained attendants who have had practical experience in their particular industry. All exhibits will be so labeled that the visitor may obtain a general knowledge by reading a brief outline explaining the principles, or, if more detailed information is desired, a complete description following the outline may be referred to. To the student interested in research or more minute detail, the files or catalogued library reference works on the subject are available.

Since technology is important only as it affects civilization, its relation to the modern world must be shown. As an example, steel will be treated not only as a great technological advance over wrought iron, but also as a product which has made possible the railway, the automobile, and the skyscraper; petroleum will be shown not only as a mineral whose products are used for fuel, but also as a basic material which has revolutionized transportation and has accelerated the development of other industries.

A brief description of some of the exhibits already prepared or planned for each sequence will give a clearer picture of the general appearance of the completed museum. Under the classification of Fundametal Sciences will be found mathematics, measurements, gravitation, heat energy, electricity, and magnetism; sound and music; optics and optical instruments; the subject of astronomy, not as it relates to the universe, but as it affects science, and its application to industry. The Hall of Timekeeping will contain exhibits of ancient chronometers, as well as the most up-to-date time pieces and will show the principles upon which all time mechanisms are based, and the importance of timekeeping in modern life. Exhibits will also show how industries have been developed from the principles of fundamental sciences; as examples, the optical, musical, photographic, and radio industries. Chemistry, like physics, will have experimental exhibits to show the basic principles of chemical reaction.

Following fundamental sciences come basic materials, and geology with mineral industries will be first under this classification. Geology, as astronomy, will be represented only as it affects industry. Here will be shown the formation of mountains, lowlands, and rivers; and their relation to mineral deposits.

Agriculture, the oldest of all industries, will follow geology, and its history will be told by dioramas depicting agricultural life of earliest man with his crude implements down through the ages to modern times. Historic reapers, plows, and other forms of farm machinery, as well as the modern tractor, will tell the story of progress in agriculture.

Motive power follows the fundamental sciences and basic industries. The story of man's use of nature's resources to do work will be told in this sequence. Starting with the earliest forms of power, the inefficient water wheel, Newcomen and Savery's clanking steam mine pumps, and passing down to the latest type of steam and water turbines, the development of generation, distribution, and transmission of power in the different forms will be told.

Eighty thousand square feet of space has been assigned to transportation, and there will be exhibited the many different ways that have been used since primitive times to get somewhere in a hurry. The subject of transportation has been sub-divided into road, water, rail, and air, and each will be treated separately. In the case of land and water transport, the development of road and right of way will be shown with the evolution

(Turn to page 21)

Jobs for Engineers

by

Monroe A. Smith, '10,
Manager of Sales Personnel,
United States Gypsum Company,
Chicago

■ ■ ■

IT is quite reasonable for the technical student to conclude that unless he applies what he has learned at college to the practice of professional engineering, the time and money spent for his education are a total loss. Since life is short and money difficult to obtain, engineering graduates are apt by their insistence on immediate employment in engineering work no matter how trivial or illy paid, to create the impression that an oversupply of engineers exists, and to produce in the employer a consideration of the possibilities of lowering the salaries of those already working at the minor tasks of engineering.

There is naturally considerable "professional" feeling in the recent graduate, who feels ready for an engineer's work after his four years' grind. The acceptance of a non-engineering job makes him feel like a traitor to his ideals. But even though in the twenty-five years since I have left Armour I have never built a railroad, designed a bridge, or secured a single patent, I believe I am an engineer, and admit a great debt to the institution that made me one.

The demand for engineers constantly varies—and more frequently against the graduate than in his favor. In my freshman year at college men were electing the particular branch of engineering they desired to pursue on the basis of the then supposed demand for civils, electricals, mechanicals, etc. Of course, they had nothing but conjecture, gossip, and inexperience to guide them in their choice; but even had facts been available and decisions carefully and correctly drawn, there never could be any assurance that the conditions on which the students' conclusions were based would not change several times during the four-year period of undergraduate work.

How, then, can we say that there is work—useful work and plenty of it—for engineering graduates? Isn't it that our concept of what constitutes engineering is a narrow one; that in confining our appreciation of what we have learned to its usefulness in solving text book problems we fail to see its wider, more useful application to the field of business?

"Pizits Sells It for Less" says the sign flaunted by a chain of southern stores; a broad boastful statement of doubtful verity. But the boastful claim which has the general approbation of all engineers—"Engineers Do It Better for Less"—may be as factless as the grandiose claim of the storekeeper. The competence of the individual engineer is immediately involved. Which is just another way of saying that all men who are labelled engineers because of a collegiate degree are not entitled to the distinction.

I believe that the label "engineer" should mean more than a man who can design "engineering works," or assemble a heterogeneous collection of devices into a planned whole to produce a factory, railroad, water works, sewer system, or CCC camp. Surely the power to "do it better for less" involves two fundamental kinds of engineering ability, the creative or inventive, and the managerial. The first will take an existing problem and by creating a more efficient motor, engine, or detail, improve the product, cut the cost, or both. The second will take the same assembly, and through investigation and analysis of its functions, without in any way altering the device, produce a more efficient whole through proper management and coordination of the parts. If this interpretation is correct, and it certainly appeals to me, the true engineer may be expected to have either an inventive ability, a managerial ability, or a combination of both.

The best training any school can give you cannot make you an inventor but the college engineer should find himself trained to management. Herbert Hoover, who became famous as the "great administrator" of the World War for his managerial ability to feed and protect the refugees in Belgium, was a world figure in mining engineering for years previous.

Though the term "engineer" is frequently employed in ways distasteful to us, we must agree that these popular connotations are none the less indirect compliments to our profession. The "efficiency engineer" who started with a stop watch and a little common sense some thirty years ago had no need for calculus or physics, but he talked well and in many cases served well.

In thirty years he alone has branched into "Organization Engineering," "Human Engineering," "Production Engineering," "Management Engineering," "Control Engineering," and whatnot. He does not draw, he does not use test tubes, and many of him couldn't tell the difference between a transit and a transfer; but the best of him went to an engineering school and is rendering a true engineering service to civilization.

There are no courses in the better schools for these popular varieties of the genus engineer—their preparation for speedy wealth and prestige would seem to be left to the correspondence schools advertising in the pulp paper magazines.

Yet my experience in employing men has led me to conclude long since that an engineering education did more than produce engineers in the narrow definition usually associated with it by the profession. Engineering, in fact, is an excellent training for a broader application of human intelligence than it is generally conceived to be at the universities.

The manufacturer who is expected to foot part of the expense of education has constantly cried for practicalness. The educators, perhaps reluctantly, have answered his demands by creating a multiplicity of specialized schools involving commerce, management, journalism, finance, physical education, sociology, and a constantly increasing number of engineering branches, where fifty years ago there were only law, medicine, science, engineering, theology, and liberal arts. I don't believe there is a business man with a college education who wouldn't agree to rewrite the curriculum of the school he attended to make it more practical. But I am equally sure no committee of such men could agree on what constituted a proper curriculum. Each would demand that the curriculum in-

clude training and research in those problems of his own business which he had been unable to solve. For the same reason, it would be extremely difficult for any group of engineers, particularly those engineers who are practicing their profession within the narrow limits of the collegiate idea, to agree on what constituted a good course in their specialty. But I am sure they would frequently agree that the subjects they flunked or slid through in college because they had no direct connection with engineering were the ones schools should stress as more than just prerequisites to a degree.

Education fifty odd years ago used to educate. The present specialization must be terrifically confusing to the young man selecting what he thinks is to be his life work. This is particularly so when one looks at the curricula of the universities and notes such entrancing and seductive subjects as "Corporate Management," "Geographic Coordination," "Money, Finance, and Banking," "Railroad Location," "Higher Structures,' "Volumetric Analysis." Perhaps they are not so mysterious to us now, but what meaning did they hold when we entered college?

What I am trying to get at in my clumsy fashion is that it is not always possible to give immediately practical education in any subject in school, but it is and has been possible to provide and compel an experience in the mental gymnastics which are as necessary to success for the average man as the training table and physical gymnastics are to the athlete.

Engineering to me does this as no other course of instruction. Fundamentally, engineering is a training in the scientific marshalling of facts; in methods of analysis which can tear complex ideas into their simpler elements; in the synthetic processes which weld them together into a new and more useful form.

Dean Louis Monin, the friendly sympathetic foster father of the Armour student body in my time as an undergraduate, once said: "An engineer can build a bridge from bluff to bluff, but he can't bluff the bridge." Now business may get but does not want bluff in its reports, accounts, and analyses, or guesswork in its planning, any more than does the engineer in his data, calculations, and drawings. Business is built on facts, and facts are certainly the province of the engineer. Why then should the engineer feel that he has prostituted his ideals if he applies his ability to manage facts to the gain of his employers and himself in general business? Minds drilled in mathematics and the logic of engineering are sound minds that prove their conclusions—safe minds trained to manage—and there are not nearly enough of them.

Of course, nothing is ever a complete bed of roses, and any undergraduate who may have done me the honor to read this far knows that it is not always easy for engineers to secure non-engineering jobs. All business men are not convinced of the advantage of engineers in jobs which don't involve the manipulation of slide rules, triangles, and drawing pens. Too often the engineering students whom the business man is persuaded to interview do not exhibit the benefits of education normally gained in grammar and high schools to the degree shown by the graduate of liberal arts or commerce. The engineer's knowledge of elementary English, history, and current events is weak. He is restricted by his desire to be an engineer and confines his reading largely to technical subjects.

Then he is so careful to avoid being called a "sissy" that he affects a tough, hardboiled make-up. The flannel shirt of the laboratory or camp may be only partially concealed by an outmoded suit redolent of mothballs. His general appearance as compared to the average man seeking employment is below par. His social graces during the introduction and departure are more those of a yokel than a collegiate. The collegiate styles affected by the liberal arts student are bad enough in an office, but those of the engineer are definitely worse.

To the student I would say "Try to avoid it"; and to the business man "Ignore it." The engineer is smart enough and alert enough to see how he differs from the other boys in your office in a few months, and with the aid of a few pay checks, his exterior should show marked improvement. The contact with his fellows will probably awaken him to the fact that slide rules, triangles, and drawing pens are not the only tools of trade.

We have seen that engineering is a broad and useful course of study. The graduate seeking employment should not permit himself to be limited by the fact that he studied engineering, or even that he studied some specific branch of engineering. He should accept the broader view that he has been trained to think logically, to handle facts, and eventually to establish that he can be trusted with the management of men and ideas. He will have to do all of this if he is to succeed as a professional engineer or business man.

Having unburdened myself of an idea that is not always kindly accepted in the faculty club but nevertheless sustained by the roster of graduates from any good technical school, I am going to attempt to be a little more practical and try to give the graduate some idea of how, if he desires, he can determine what he should do when he graduates about getting a job. He will determine at the same time whether he is really an engineer or has an education which is more completely applicable in his case to things normally not considered engineering.

In the last five or six years most of the engineering graduates have been thankful to do anything from running errands for the telegraph company to making exact determinations of the height of the oil in the crank case of a Ford, but even during times of great stress, it is possible for the young engineer who determines through self-analysis what job he is fitted for to find an opening to such a job.

Naturally, this is rather dangerous for an employment manager to discuss, but since I have said that engineering is a broadening education, I feel certain that the graduates who may read this will not inundate me with requests for positions until they are firmly convinced after full self analysis that they want to work for my employer. If they can prove to me then that there is a place for them—and that is what I will make them do—they will get it.

What I would do if I were graduating from college in June this year would be to sit down with myself when I felt particularly contemplative and when I thought my mind was exceptionally fair and that my appraisal would be the sort of appraisal the most vindictive professor gives on examination. I would start logically an exhaustive process of introspection. I would begin to put down on paper without much order, just as they occurred to me, those courses in college which I liked best, courses which were so interesting I felt prompted (whether I acted on the feeling or not) to go to the library for books of further information on the subject. I would go through the entire curriculum in this fashion, listing everything I had learned or attempted to learn in the order of its appeal to me as an individual and my knowledge of the course, which might be quite different from the grade I had been awarded. Then I would make a careful appraisal of those things which were not concerned with education which I liked

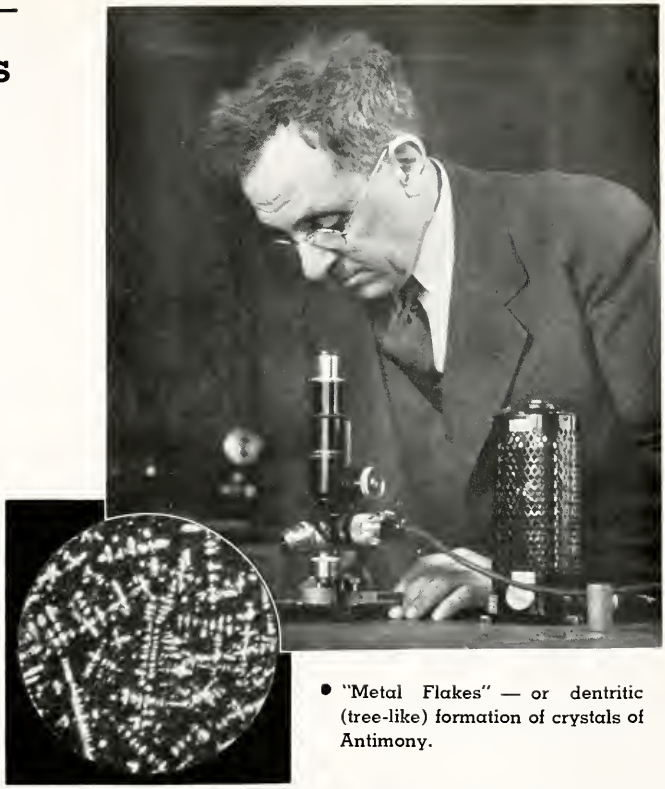
(Turn to page 22)

New Metals

by

Arthur H. Carpenter
Associate Professor of Metallurgy

■ ■ ■



● "Metal Flakes" — or dentritic (tree-like) formation of crystals of Antimony.

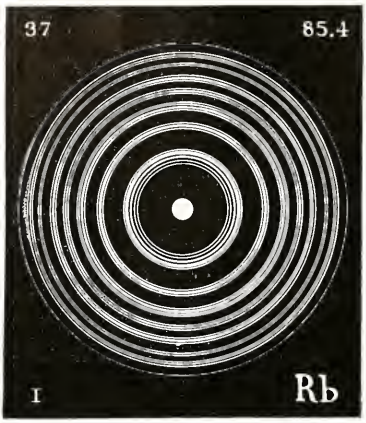
The evolution in metallurgy has been so rapid, so far reaching, and so fundamental in character that nearly all of our metals seem new. The fact is, not one of them is really so. However, there is new knowledge, there are new processes for their recovery, and new applications. For a century or more, metals that are now found in common use were considered rare and little more than curiously interesting elements in the chemists' list. A table of the different elements used in the construction of an automobile or an aeroplane today would be impressive. Those found in a good radio set would astonish even a Jules Verne.

Dr. H. O. Hofman, late head of the Department of Metallurgy at the Massachusetts Institute of Technology once said that metallurgy was about 10% science and 90% art and practice. Since then, some thirty years ago, there has grown a new "Science of Metals" so different and modifying in its influence on the practice of the art, that this saying is outmoded now. It tends to point out the ancient and honorable lineage of metallurgy that has descended from the days of Tubal Cain, who, we are told, was a "great forger of all cutting tools, of iron and of brass." The metallurgist knows that he must have been a good "heat-treater."

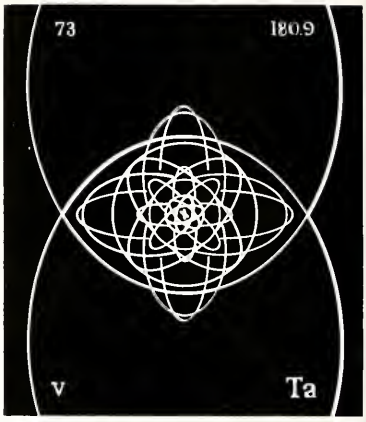
Heat treatment, the fashion today in metallurgy, is also very old, so old, in fact, that its origins antedate the dawn of recorded history. It is still news to the layman, however. Now the possibilities of correct heating cycles in the preparation of all metals is beginning to be widely understood. The superiority of the famous swords, "Toledo blades" and "Damascus blades," was due to correct heat treatment, applied perhaps in a mystic rite and ceremony, but by the same steps as would be used today. The "magic" was in the allotropic propensities of iron rather than in the mystic ceremonies of the ancient craftsman. This same magic still lies at the basis of all modern heat treatment cycles. The astonishing ability of iron to undergo a complete change of state in the solid condition analogous to the difference between graphite and diamond in the case of carbon, the so-called alpha-gamma transformation, is responsible. This change is better understood now since the advent of x-ray studies of atomic structure, though it still has secrets to be ferreted out by more fundamental researches in the future. Even the metallurgical engineer is amazed at the developments of this modern heat treatment, so simple in principle—a cycle of "heating," of "holding" or "soaking," and then of "cooling" rapidly or slowly (now carried out under exact thermo-electric control), followed by another cycle of heating and cooling.

The significance, therefore, of the word "new" in the title of this article is that the use of some metals is very old. Seven metals were known to the ancients, viz., iron, copper, gold, silver, lead, tin, and mercury, although the ancients did not recognize mercury as a metal. Antimony may have been known by the ancient Chinese before it was known in Europe, although probably not classed by them as a metal. Some of its compounds were used by many ancient people as a medicine and as a poison. Zinc was used in alloys with copper, the making of the alloy being described by Aristotle as a process of smelting copper in small furnaces with certain earths known as "calomines" which, it was known, changed the properties of copper both in color and hardness. They naturally did not know that another metal was reduced in this way. It was just a "virtue" contributed by "Calomines." The element "zinc" itself was not isolated until about the close of the seventeenth century. It is said to have been first reduced to metal by the inhabitants of India who thought it was a new kind of tin.

Superficially many metals look alike. In other ways, also, they are similar in their properties. Such properties as hardness, tensile strength,



X-ray spectograph of the metal Rubidium



Calculated orbits of the electron shells of the element Tantalum

weight, or specific gravity are periodic functions of their atomic numbers, and it follows that often several of them might do equally well for a specific application. The selection would then be one of expediency or expense. Rarely is there a "best" metal for a particular purpose. Some of those formerly considered rare have very valuable singular properties or possess some of their properties in a higher degree than others. These are the materials vaguely referred to as the "new metals." They are new only in application, and hence there has been a development of a new metallurgical technique to produce them in sufficient quantities for industrial application.

One is not often aware how long most of these elements and their properties have been known. One of the very interesting rare metals now coming into use for containers for vessels in exact chemical research is Tantalum. It has been well known since 1803, tungsten since 1781, molybdenum since 1778, and columbium (called "niobium" in Europe) since 1801. Manganese has been known since 1774, but its oxide the mineral "pyrolusite" was known and used by the ancient Greeks who called the mineral "manganese." Magnesium was recognized as a metal and named by Davey in 1807, but he could not separate it from its compounds (this was first accomplished by A. A. B. Bussy in 1829). Cadmium has been known since 1817, nickel since 1751, potassium since 1807; while rubidium and ceasium (which should have been spelled ecosium) were the first metals to be discovered by the use of the spectroscope, accomplished by Bunsen in 1860 or 1861. Platinum may have been known by the ancient Egyptians, one thousand years or more B. C., for alloys of it with gold have been found among their remains. It was rediscovered in the early 18th century, and has been in general use since 1750. Vanadium was first recognized about 1793 or later, and rediscovered two or three times. It occurs in small quantities in all Swedish iron, so famous the world over for its superior qualities.

It is believed that it was really the discovery and exploitation of extensive deposits of vanadium in Peru soon after the turn of the 20th century and the attempt to introduce it as a general element for alloying in steel that first taught the importance of careful heat treatment of steel. It was discovered that unless the steel received a proper heat treatment that the effect of the addition of vanadium was practically nil. The advantages of vanadium as an alloying element for steel had been pointed out earlier by distinguished European metallurgists.

The element rubidium, first discovered by the use of the spectroscope, is an active alkali metal. It is now the essential element in photo-electric cells, and its commercial metallurgical production is now well established. It is said to be "the retina of electric eyes" which are used in photography, in television, counting units, for sorting materials according to color, and in many other ways. Professor Arthur H. Compton pointed out that the sensitivity of rubidium to light rays and colors was similar to the color values of the human eye, more so than that of other metals that could be used. Potassium and ceasium have also been used for the construction of these cells. Rubidium apparently has the best combination of properties for the purpose. These sensitive cells are used in astrophysics and astronomical investigations into stellar radiation, and new and startling discoveries have been ascribed to its use. Man's ingenuity will gradually introduce these cells, so that he will almost possess the "all seeing eye" that used to be ascribed to the gods. These metals are too active to use except in vacuum tubes out of contact with the atmospheric gases such as oxygen and water vapor. As they have relatively low melting points their high vapor pressure makes them ideal for use in these tubes because their vapors are so easily ionized.

Tungsten and tantalum are among the "new metals" because of our modern requirements calling for special properties possessed in high degree by these elements. Tantalum was first used in Germany for filaments in electric light bulbs, but its use was early replaced in this country by tungsten, the use of which is now practically universal. Both of these metals possess very high melting points, although tungsten is superior in this respect. t replaced tantalum largely because it is much more abundant and hence less costly. Tantalite and columbite minerals are found only in a few places, while tungsten mineral occurs everywhere. Its chemistry and metallurgy are simple and less costly. Tantalum has a higher radiation coefficient than tungsten, nickel, or molybdenum. Columbium occurs with tantalum, and the metallurgical processes for these three metals is similar. In nearly all of the applications to which tantalum and columbium are put, tantalum is to be preferred at present because of its lower cost and because it is slightly more resistant to chemical attack than is columbium. Tantalum is finding extensive use in the manufacture of the internal parts of vacuum tubes where its use can be economically justified by the advantages obtained, particularly for the manufacture of grids and for plates in high-power tubes. Most tube engineers recognize the superiority of

(Turn to page 24)

The New Cooperative Course in Mechanical Engineering

by

H. T. Heald

Dean Heald

FEBRUARY 3, 1936, marked the beginning of a new plan in education at Armour Institute of Technology. Thirty-eight earnest young men began class work in a five-year cooperative course in Mechanical Engineering. At the same time, an equal number started to work in twenty-nine of Chicago's leading industries. At the end of an eight weeks' period each young man in industry will relinquish his place to his alternate from school and will then attend classes himself for the following eight weeks. Thus, the student has alternate periods of school and work throughout the five years of the course. At the end of this period, the regular curriculum in Mechanical Engineering, leading to the Bachelor of Science degree, will be completed, and in addition, the student will have acquired considerable practical experience in industry.

The new five-year cooperative course in Mechanical Engineering does not in any way replace the existing four-year program, but is intended entirely as a supplementary method. There is no fundamental difference between the curricula in the two courses and the student earns the same degree in both. The primary purpose of this program is to make it possible for well qualified high school graduates of limited financial means to secure a first-class engineering education. Industries are attracted to the plan by the opportunity it offers to recruit high grade young men who can obtain practical experience in parallel with an engineering training. Students are attracted to this course because it makes it possible for a young man to earn his entire college expenses, exclusive of board and room, and because it affords an excellent opportunity for the correlation of theory and practice.

The general idea of cooperative education is not new. Such a plan was first begun at the University of Cincinnati in 1906, and the entire program at that university is now carried out on the cooperative basis. Since that time, numerous other institutions have used the plan successfully, the details of operation differing in the individual schools. The new course at Armour represents the first development of this type of work in Chicago, and as such seems destined to be of real service to the industries and to the people of this area.

Some interesting problems present themselves in selection of students for the cooperative course. Students must be chosen who are likely to be successful in industry as well as in their college course. This means that a candidate must have not only the intellectual capacity to carry a rigorous engineering program, but he must also possess those physical and personal characteristics which will make him acceptable to the cooperating company. Obviously, he must be sound in health and able to apply himself steadily to the alternate program of work and study throughout the calendar year since in this program he has only two one-week vacation periods. Students actually admitted to the course have come from two principal sources: first, young men already at work in the cooperating industries who have shown promise in their work and who have demonstrated by their high school record a capacity to do satisfactory college work; second, recent high school graduates of demonstrated high scholastic standing, whose personal qualifications are such as to make them acceptable to the school and to the industry as new employees. A supply of applicants of this type was obtained through the cooperation of principals and vocational advisors of Chicago and suburban high schools, and none were considered without such a recommendation. In actual operation this year, about one-half of the students selected came from each source, and no student was permitted to enroll until his qualifications had been approved by both the school and the industry to which he was assigned.

Wages of students employed in the plants are fixed at a minimum of $15 per week, and in numerous cases higher wages are being paid where the man has practical experience and is of proven ability. Tuition for the cooperative course is $80.00 for each of the three school terms, making a total of $240.00 for the year. This tuition is paid by the student himself from his earnings in industry.

Inasmuch as the new cooperative course is in Mechanical Engineering only, the participating industries have been largely limited to those which employ mechanical engineers, and where the manufacturing operation is primarily metal working. The following companies are cooperating with the Institute at the present time: Acme Steel Co.; All Steel Equipment Co., Inc., Aurora; W. D. Allen Mfg. Co.; American Can Co.; American Forge Co.; American Manganese Steel Co., Chicago Heights; American Steel Foundries, Indiana Harbor; Belden Mfg. Co.; Buda Co., Harvey; Chicago Screw Co.; Container Corp.; Danly Machine Specialties, Inc.; Delta Star Electric Co.; Foote Bros. Gear & Machine Corp.; General Electric X-Ray Corp.; Goodman Mfg. Co.; Great Lakes Forge Co.; Illinois Tool Works; Inland Steel Co., East Chicago, Ind.; W. A. Jones Foundry & Mach. Co.; Link Belt Co.; Lyon Metal Products, Inc., Aurora; Miehle Printing Press & Mfg. Co.; Pyle-Na-

(Turn to page 23)

Meet the

• Willard E. Hotchkiss

WILLARD EUGENE HOTCHKISS, president of Armour Institute of Technology since 1933, was born in Amber, New York. While a student at Cornell, he was winner of two fellowships, one of which involved a study of budgetary control in France and Germany. He holds a degree of Doctor of Philosophy from Cornell University and an honorary degree of Doctor of Laws from Northwestern.

Dr. Hotchkiss organized schools of business in three major American universities—Northwestern in 1908, University of Minnesota in 1919, and Stanford in 1926. Along with his promotion of education, he has been occupied with various activities in business and professional life and in public service. In 1920, he was executive secretary of President Wilson's Industrial Conference, and in 1923 he became a member of the Research Staff of the United States Coal Commission. He also served as educational director of the Institute of American Meat Packers. He was director of the National Industrial Federation of Clothing Manufacturers from 1920 to 1925, and in 1934 was appointed chairman of the National Recovery Administration General Code Authority.

In polities, he has always been independent. He is a member of the Phi Beta Kappa and Delta Sigma Pi fraternities, and of the University Club, the City Club, and Rotary Number One.

* * *

• Frank Knox

FRANK KNOX was born in Boston, Mass., and educated at Alma College, in Michigan. Soon after his graduation, he went to Cuba with "Teddy" Roosevelt. This friendship was an important factor in shaping his character and crystalizing his ideals.

Returning from the war, he took up newspaper reporting on the *Grand Rapids Herald,* and in rapid sucession passed through all the grades to the position of publisher. In 1912, Knox went back to New England to become editor of the *Manchester* (N. H.) *Leader.*

In 1917, war once more claimed his interests. He enlisted as a private in the First New Hampshire Infantry, but by the end of the conflict he had attained the rank of colonel.

After another seven years' service on the *Leader,* he went to Boston in 1926 to assume the editorship of Hearst's *Boston American.* A year later he became general manager of all the Hearst papers, a position from which he resigned in 1931 to take control of the *Chicago Daily News.*

At present, the Colonel is active politically and is considered seriously by many as a possible candidate for the Republican nomination for President of the United States. At sixty-two, Frank Knox still retains the powerful physique, the sense of humor, and the forceful manner which have made him so successful in the newspaper world.

* * *

Howard L. Krum •

Since his graduation from Armour in 1906 HOWARD KRUM has devoted continuous service to the invention and development of the Teletype. He is now Vice President of the Teletype Corporation, as well as Secretary and a Director of International Inventions Corporation.

Before entering Armour he spent two years in Europe studying music, an art in which he has retained a lively interest. A Fellow of the American Institute of Electrical Engineers, and a member of Tau Beta Pi, Mr. Krum was recipient of the Distinguished Service Award of the Armour Alumni Association in 1933. When released from the cares of his work, Mr. Krum can frequently be found in Florida, where he engages in the exciting hobby of deep-sea fishing.

• James O. McKinsey

Trustees

From country lad on a Missouri farm to chairman of the largest mercantile establishment in the world is the amazing record of achievement of JAMES O. McKINSEY.

Working his way through school, he graduated from the Missouri State Teachers' College, at Warrensburg, at the age of nineteen, and became superintendent of a high school. After five years, he took up law at the University of Arkansas, and then commerce at St. Louis. Still unsatisfied, he came to the University of Chicago for further study; and it was here that he became interested in the subject of budgetary control for large business and manufacturing firms. In 1916, he was made a member of the faculty of the University; and he has lectured at higher schools of learning throughout the country.

Since 1919 he has also been engaged in professional practice; but it was not until 1925 that he organized the firm of James O. McKinsey & Company, of which he is senior partner. This company has solved numerous major problems in control, organization, and personnel for many large corporations; and it was largely because of his impressive work for Marshall Field & Co. that he was made chairman of their board and senior executive officer.

Here, at the Institute, we know Mr. McKinsey for the analysis he made of us a few years ago, a report which plays an important part in our present activities and our future plans.

J. J. Merrill •

He is a director and member of several business and professional associations in Chicago and New York.

* * *

MR. J. J. MERRILL, because of his ability with devices mechanical, obtained as one of his first jobs a position as a machinist. Before he was twenty-eight years of age he had held several positions of responsibility: one as engineer in a rolling mill, another as chief engineer in a large wagon works, and still another as chief engineer of thirteen manufacturing buildings. After seven years with the Chicago Sugar Refining Company in the capacity of chief engineer and master mechanic, Mr. Merrill became a boiler salesman for Babcock and Wilcox. Five years later he entered the employ of the Corn Products Refining Company, of which he is now chief engineer.

Although he has been active in the business world Mr. Merrill has found time for many outside interests. He is a member of long standing in the Chicago Athletic and South Shore Country Clubs. He is president of the Island Club—a duck-shooting organization.

* * *

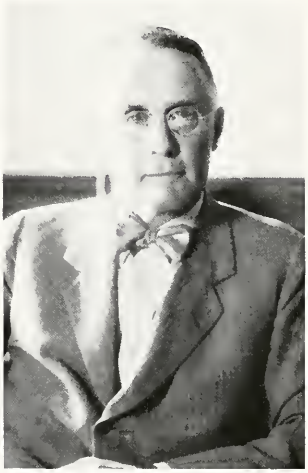
JOHN J. MITCHELL, corporation official, besides being Vice President and Treasurer of the Universal Oil Products Company of Chicago, President of the Chicago Tunnel Terminal Company, and a Director of several corporations, has taken an active interest in the development of commercial aviation in this country. Leaving Yale in April, 1917, he enlisted in the United States Naval Aviation Reserve, and received the commission of Ensign at the close of the War. Recently he was commissioned a Lieutenant Commander. Mr. Mitchell was one of the organizers and Secretary and Treasurer of the National Air Transport Company from 1925 to 1930, and has been an officer and director of some ten large aviation corporations.

In 1921, Mr. Mitchell married Lolita Sheldon Armour, daughter of J. Ogden Armour. They have two children—a son three years old, and a two-year-old daughter.

Local treasurer of the Salvation Army for the past fifteen years and a Trustee of Armour since 1927 show Mr. Mitchell to be public-minded. His hobbies are his home in Montecito, California, sailing his sloop on the Pacific, horseback riding, and the running of an extensive ranch in Santa Inez Valley.

• Sterling Morton

John J. Mitchell •



William S. Monroe •

• Harold W. Munday

WILLIAM S. MONROE graduated from Cornell University in 1890 with the degree of M. E. Shortly after graduation he assisted in designing and constructing the power plant for the World's Columbian Exposition. Until the turn of the century Mr. Monroe was chiefly engaged in the mechanical and electrical work for office buildings. In April, 1900, he entered the employ of Sargent & Lundy as chief draftsman. By 1912 he was a member of the firm, and when the company was incorporated in 1919, Mr. Monroe was appointed president, a position he still holds.

Since 1919 Mr. Monroe has been connected with the designing and building of many of the most important electric power stations in this country.

C. Paul Parker •

"When it rain, it pours." For eleven years, the period from 1906 to 1917, STERLING MORTON was actively connected with the Morton Salt Company which uses these words as a trade name. Since 1917 he has acted as a Director and Secretary of this company.

Mr. Morton is a native of Chicago, being born here on August 25, 1885. His education was begun in the local schools; continued at Chateau de Laney in Geneva, Switzerland, and the Lawrenceville Schools of Lawrenceville, New Jersey; and completed at Princeton University in 1906 when he received his B. Litt.

Recognizing the value of the printing telegraph apparatus invented by the Armour graduate, Howard Krum, Mr. Morton became president of the Morkrum Company and began manufacturing this equipment in 1917. This organization later became the Teletype Corporation, and was finally absorbed by the American Telephone and Telegraph Corporation in 1930.

At the present time, Mr. Morton is President and Director of the Morton Building Corporation and of the Louisiana Furs, Incorporated; a Director of the Elgin National Watch Company; Secretary and a Director of the Morton Salt Company; and Vice President of the Illinois Manufacturers' Association.

Sailing, shooting, and riding are his hobbies. He is personally interested in the advancement of scientific knowledge, and is a member of the Field Museum of Natural History, Art Institute, Shedd Aquarium, and Academy of Sciences.

* * *

HAROLD WALKER MUNDAY was born in Watertown, Massachusetts, in 1901. His primary and secondary education was secured largely in the east. He came to Chicago in the fall of 1917 and completed his secondary education by graduation from Senn High School. He entered Armour Institute of Technology in September, 1919, and graduated with the Class of 1923 with the degree of B.S. in Civil Engineering.

While at Armour, Mr. Munday was very active in student affairs, being the principal organizer of the Armour Tech Athletic Association, the Armour Chapter of Triangle and the Armour Chapter of Chi Epsilon. He was also president of his graduating class.

Upon leaving Armour, Mr. Munday went to work for the Heywood Wakefield Company as a planning engineer. Seven months later he was offered the position of associate editor of Pit and Quarry, and three months later he became editor-in-chief. For five years Mr. Munday continued in the publishing business as editor-in-chief of these publications.

Mr. Munday left the publishing business in 1929 to go into the engineering and manufacturing business with the McGann Manufacturing Company, of which company he is a Director, Vice President and Treasurer. Mr. Munday is also interested in other companies including the A. Huhn Manufacturing Company Schaffer Poidometer Company, The Cuno Engineering Corporation, Kerlow Steel Flooring Company and the McLanahan & Stone Corporation.

* * *

C. PAUL PARKER was born in Elmwood, Nebraska, in 1889. After receiving his high school education there, he moved to Chicago. Here he studied engineering at Lewis Institute and law at Northwestern University and Chicago-Kent College of Law.

It did not take him long after his admittance to the Bar in 1913 to become engaged in his own business venture, as in 1915 he became a partner in the patent law firm of Miller, Chindahl, and Parker. This company was succeeded by Chindahl, Parker, and Carlson, and later by the present firm of Parker, Carlson, Pilzner, and Hubbard. The firm specializes in the law of patents, trade-marks, copyrights, and unfair competition. The principal offices are located in Chicago and Washington.

* * *

Corrections

In our last issue, we incorrectly stated that GRIFFENHAGEN & ASSOCIATES had been established only fifteen years and were engaged in work only in the field of government. It should have been stated that GRIFFENHAGEN & ASSOCIATES have been established for twenty-five years and that they have also rendered considerable service in problems of management for large, privately-controlled enterprises.

Mr. ROY M. HENDERSON has called our attention to a regrettable error. We stated that he is President of the United Engineers & Constructors, Inc. Actually, he is President of the United Engineers & Constructors (Canada), Limited, the Canadian subsidiary of the parent Corporation. He is also Chicago Manager of the U. S. Corporation. His headquarters are at Chicago, whereas the parent Corporation's headquarters are at Philadelphia.

JOHN SCHOMMER Says

THE eighth Armour Tech. Relay Carnival is to be held at The University of Chicago Field House, 56th St. and University Ave., on March 21st. The finals begin at 7:15 P. M. and will last until about 10:30 P. M. The prelims. begin early in the afternoon so that nothing but finals will be seen in the evening. This carnival has grown to be the outstanding indoor track meet in the central west. Last year over 400 athletes from 36 colleges and universities competed in the special events and relays. The outstanding athletes who competed broke and tied a number of records.

The meet this year will have an added zest due to the fact that the Olympic committee on Track and Field Events has designated our carnival as a Regional Olympic Tryout meet which will entitle the winners of first, second, and third place, respectively, to compete in the semi-finals for the American - Olympic Track Team that will represent the U. S. in Germany this summer.

Further to arouse your athletic sensations there will be held an All Round Championship, consisting of seven events: the 16-pound shot put, the broad jump, the high jump, the pole vault, the 70-yard high hurdles, the 60-yard dash, and the half mile. Watch the daily newspapers for the star entries in this series of events.

There will be relay after relay race while the shot, pole vault, and high jump events are being held. Throughout the evening, our own Armour "Tech." band will furnish stirring music while the shouts of the victorious teams resound through the old maroon Field House.

With the hundreds of "Tech." students, the faculty, many of the alumni, and the general public that are always present, the seating capacity has always been severely taxed, and there have always been about 500 people standing. If you are planning to come—be there early. There are ample parking facilities all around the field house.

The tickets are $1 00 each and may be procured from John J. Schommer, 3300 Federal St. Send for your tickets immediately, or you will be too late.

Alumni Banquet

Tuesday, June 2, 6:30 p. m.

Medinah Athletic Club

Ample Parking Space

Reservations: Call or Write

Tickets $1.75

D. P. Moreton

J. J. Schommer

VICtory 4600

What's going on

A.T.A.A. Becomes A.T.S.A.

The old Armour Tech *Athletic* Association has been changed to the Armour Tech *Student* Association after separate action by each of the four classes and general approval by the entire student body at an assembly March 6. Hereafter, the constitution of the new association and a financial report must be published annually.

* * *

Vincent Bendix, Trustee, Awarded, Legion of Honor

Vincent Bendix, well-known trustee, was recently awarded membership in the FRENCH LEGION of HONOR. This coveted decoration was presented to him in recognition of his work of organizing at South Bend a branch of the ALLIANCE FRANCAISE, and for his unselfish interests in the social and economic relations of the employes in the Paris plant of the Bendix Aviation Corporation, of which Mr. Bendix is chairman.

* * *

Shops Reopening

After being closed for three years, the second Armour shop was recently opened, and is offering a course in welding. The third is expected to open this fall with a course on the technique of making all types of castings.

* * *

Von Gehr '28 Wins Prize

George H. Von Gehr, E.E. '28, recently took second prize with honorable mention, carrying a cash award of $100, for an essay on the subject, "A Survey of the Principal National Patents Systems," in a contest sponsored by the Linthicum Foundation. First prize in this world-wide contest went to a Mr. Vojacek, Vice-President of the Czecho-Slovakian Association of Patent Attorneys. The awards were made upon the recommendation of the Faculty of the Northwestern University.

* * *

New Staff for Tech News

The Armour Tech News announces a new staff headed by F. L. Leason, editor. The heads of other departments are N. Gerber, managing editor; J. M. Kubert, sports editor; E. J. Simek, business manager; and S. Rabinowitz, news editor.

* * *

Prof. Ensz at Harvard

Professor H. Ensz is away on leave studying soil mechanics under the noted Prof. Terzaghi, at Harvard.

* * *

Frank Oster at Augustana Home

Frank Oster, former custodian of the Institute and familiarly known to thousands of Armour men as "Frank," has entered the Augustana Home for the Aged, through the generosity of Max Woldenberg of the class of '06. Needless to say, Frank will be delighted to have visits and letters from his many friends.

* * *

Scherger Speaks to Students

Dr. George L. Scherger, now on leave from his duties at Armour, spoke a few weeks ago to an assembly commemorating the birthdays of Washington and Lincoln. Evidently he is as popular as ever with the students.

* * *

"Please Believe Me; This Never Happened Before"

For a long time Prof. R. L. Stevens had been at school every day on time without a break. It came at last, however: it was his left arm.

Check

Interhonorary Banquet

The Interhonorary Fraternities held their annual banquet at the Adventurers' Club on February 24, John O. Larson of Tau Beta Pi officiating. After the introductory speeches of Dr. Hotchkiss and Dean Heald, and remarks by Prof. Leigh, Dr. Owen R. O'Neill thrilled both students and members of the faculty with an amazing and thrilling account of his life and adventures in South Africa.

* * *

Dr. Oldenburger at Math Meeting

Dr. Rufus Oldenburger presented a paper at the recent meeting of the American Mathematics Society at St. Louis.

* * *

New Profs for Co-Op Course

The recently established Co-op course in Mechanical Engineering has necessitated the adding of two new men to our faculty, Dr. Carl J. Anderson, mechanical engineering, and Dr. John J. Corliss, mathematics.

* * *

Musical Clubs Give Concert

On Feb. 28, the Musical Clubs, of ninety voices and forty-five instruments, gave a concert at the Goodman Theater to an enthusiastic audience of more than 700. It was directed by Gordon Erickson, and sponsored by the Faculty Women's Club.

Solitude

Faculty Women's Club Party

The Faculty Women's Club entertained the members of the faculty on Washington Day at the Chicago Woman's Club with a banquet, speeches, toy-whistle concert, and tin-pan symphony. Mrs. W. H. Hotchkiss, president of the club, was mistress of ceremonies.

* * *

Fraternity Notes

Much can be said concerning the Interfraternity Formal held March 7, but it certainly was a successful affair. In a short resume: PHI PI'S won their 18th consecutive victory in basketball, held a gala New Year's Eve party, and elected officers; PHI KAP'S initiated four men in conjunction with Chicago and Northwestern at the Interfraternity club February 24, and Chicago was host to a celebration the following Saturday night; PI KAPPA PHI'S initiated seven men March 1; KAPPA DELTS' had an alumni and active smoker February 4, a splash party March 14, initiated 3 men and elected officers; while the RHO DELTS welcomed two of their founders; TAU DELTS' tried an innovation on March 1 and held a Sunday Tea Dance, 3 delegates toured the south while attending a national convention at Norman, Oklahoma, a visit by the traveling secretary, and initiation on March 15 complete past events.

The national convention in Columbus, Ohio, this spring is drawing the attention of TRIANGLE. The KAPPA DELTS in keeping with their policy of "event a month" are planning a radio dance April 7, and a Dinner Dance May 30. The DELT Prom on April 4 is attracting the TAU DELTS' attention while plans for a Founder's Day celebration May 10 will concern them soon. The positions of captain and manager of the basketball team go to two PHI'S, which is to be expected. The RHO DELTS will initiate five men on March 21 and have netted four pledges in their second semester drive. THETA XI's are planning a party now that they are in new quarters. Everyone is priming for the ping-pong competition.

* * *

Sports Review

Several weeks ago our wrestling team clamped down on Wright Junior College and took them into camp—32½ to 1½. . . . There is a rumor that Wright is trying to book Luey Flower for a good rowdy tea-dance later this season when they round into better shape. . . . "Armour Golden Glovers Stay to Quarter-Finals"—Headline. . . . At last someone caught up with Chase Joerns. . . . "Smoky" Stober hurt his hand lambasting an opponent. . . . Take it easy, George. . . . Phi Pi Phi took the Inter-Fraternity Basketball title again. . . . That makes eighteen in a row. . . . Ho-hum. . . . Jack McDonald, a freshman track star, is laid up at present with a pulled muscle. Tough luck, Mac. . . . (Tough luck Armour?) . . . Ropek, our freshman wrestling phenom, picked up his five easiest in the North Central meet when his opponent failed to make weight. Ed. note ("I'd go out for wrestling myself if I could count on that") . . . Norm Root, former University of Chicago track star and our new track coach, is readying our tracksters for the Relays and is hoping . . . (Don't miss "Jawn's" article in this issue on the Relays—We'll see you there) . . . Mark Dannis, a junior, in his first year out for track is improving 100% each time he runs. . . . The Physics Dept. assures us there is a limit, however. . . . Our freshman basketeers completed their season with three wins and a loss. . . . Nice going boys. . . . To date our wrestling team has won three and lost as many. . . . Isn't there a song, "Let's Start All Over Again?" . . . Paul Henriksen and "Shorty" Swanson looked good with the freshman cagers this year and are expected to worry the varsity next year. . . . Was that "Round and Round" Henry "Caruso" Bodnar was singing under his all out of breath on the fourteenth lap of the 2-mile? . . . Faust, Bodnar, and Dannis sound good harmonizing in the showers. . . . Ask any one of them. . . . Our basketball team's co-captain, "Pop" Warner, and "Dolly" Dollenmaier have played their last games for A. I. T. . . . Goodby and good luck. . . . 'Gene Heike was high point man as usual this season. . . . In the recent Armour-Loyola track meet "Bud" Dunbar entered six events and garnered a total of 6¼ points, with at least a point in every event. . . . "Something attempted, something done." . . . Ralph Tullgren, another freshman, is one of the bulwarks of the wrestling team. . . . Dear me, what would we do without these freshmen? . . . The varsity cagers ended the year with a record of eight wins and seven losses. . . . In a recent edition of the *Chicago Herald and Examiner* Warner and Dollenmaier were described as "two of the best guards Coach Krafft has turned out." . . . Neither of them has seen his shoes in the last week. . . . Dodge, Windblad, and Svagdis: three, need I say it, freshmen, are expected, with a little more experience, to do great things for the swimming team. . . . The class of '38 took the Inter-Class Track meet last January 17th. . . . The frosh and the sophs each took three firsts, but the sophomore's six seconds clinched the meet for them. . . . Incidentally, a pile-driver would make an admirable fourth in the aforementioned shower room trio. . . . Let's support our teams, Armour. They deserve it.

* * *

June 2

Seniors and Alumni! Save the date, and save your pennies—one hundred and seventy-five of them—for the ALUMNI BANQUET to be held at the Medinah Club on June 2, at 6:30 P. M. Call up D. P. Moreton or J. J. Schommer for reservations. Get in touch with your old classmates and plan to get together.

Foils and Sabers

Missing Men (and Ladies)

Do you know any of the lost "old grads" whose names appear in the accompanying list? It would appear that some four hundred of our Armour Alumni are missing. It is not that we don't have addresses, but the addresses we do have are no good. Did you say you graduated in '12? That's fine. Just look at the long list of strayed members of the class of '12. How many of their present addresses do you know? Possibly you know some of the strayed members of other classes. And perhaps it would be best to start with the class of '97 and go through the whole list. Then if you will just sit down and write us a letter, including in it the correct addresses and business connections (if possible) of the lost alumni that you know, you will be rendering your old Alma Mater a great service.

Now that we have done as much as we can for the lost sheep, let's get personal. What have you been doing of late? Are you still working in the same place? You aren't? Why haven't you told us before? We are really very interested in all of your aetivities. So be sure to mention yourself in that letter you are writing. We should appreciate any other alumni news that you may have.

Now looking just a wee bit into the future we see the important date of June 2, 1936. That is the date of the Spring Alumni Banquet to be held at the Medinah Athletic Club. Be sure to keep that date in mind. Make your reservation as early as possible with J. J. Schommer or D. P. Moreton, here at Armour. Are you willing to assist in making a success of your class reunion at the banquet? If so just tell us about it in that letter. If you are interested in forming an Alumni Club in your vicinity let us know about that too, so that we may help you.

Didn't your wife mention the other day that the young fellow living next door is going to college in the fall? She did? Then be sure to include his name and the names of any other prospective students in that letter.

It certainly seems as if you will have a variety of topics to write about, but it will not take long. First the addresses of those lost, strayed, or stolen men; second, all the alumni news you can think of; third, the banquet; and fourth, the names of prospective students.

Thanks, we enjoyed your letter a great deal, and you'll hear from us in the next issue.

1897

Abell, H. C., E.E.
Salamson, Max., E.E.

1898

Kappes, E. F., E.E.
Weinsheimer,W.F.,E.E.
White, E. C., M.E.

1899

Matthews, W. D., E.E.
Morse, C. S., E.E.

1900

Campbell, Mrs. M. W., C.E.
Fisher, C. H., E.E.
Martin, R. C., E.E.

1901

Arnold, M. H., E.E.
Baker, E. H., M.E.

1902

Baird, M. F., E.E.
Benham, Adelaide E., Arch.
Harwood, Ed. T., C.E.
Miller, I. D., C.E.
Wallace, E. L., E.E.

1903

Brimson, Chas. T., C.E.
Kaempfer, A., E.E.
Weisskopf, M. J., C.E.

1904

Knapp, M. J., E.E.
Watt, J. M., M.E.
Wickersham, E. J., M.E.

1905

Ash, Howard J., E.E.
Beamer, B. E., E.E.
Brackett, J. C., E.E.
Goldsmith, F. R., M.E.
Harvey, W. F., C.E.
Kadic, Jos. F., E.E.
Stem, L. H., Ch.E.
Tyler, Alva W., E.E.
Whitney, F. B., C.E.
Wickersham, Edw. J., E.E.
Wright, M. F., E.E.

1906

Cook, N. W., Arch.
Cutler, Edw. W., E.E.
Edson, N. L., M.E.
Kukawski, E. S., Arch.
Morrison, R. D., M.E.
Scott, P. J., M.E.
White, E. C., M.E.
Wilson, Fred N., M.E.

1907

Badger, L. H., C.E.
Heinsen, Geo. M., C.E.
Kilgore, C. E., M.E.
Thompson, M., C.E.
Turnbull, I. J., M.E.
Young, L. B., C.E.

1908

Andrews, E. E., Ch.E.
Cahan, Jas., C.E.
Collins, F. C., E.E.
Cornwell, A. B., E.E.
Jacobson, Jos. H., E.E.
Latta, Smith H., M.E.
Lodbourrow, Jos. D., M.E.
Morey, C. R., E.E.
Morgan, Chas. W.,M.E.
Winser, Roy A., Ch.E.
Zimmerman, S. L., C.E.

1909

Ahern, John F., F.P.E.
Binder, G. A., E.E.
Buckett, A. C., Arch.
Dick, D. D., C.E.
Frisbie, H. C., C.E.
Grassby, G. A., Jr., M.E.
Guthrie, J. F., E.E.
Perrine, A. A., E.E.
Richards T. E., Jr.,C.E.
Von Gunten, O., Arch.

1910

Crocker, A. H., Jr., M.E.
Gentry, T. E., M.E.
Kadic, Jos. F., E.E.
Leavell, R. A., M.E.
Moyses, H. E., E.E.
Pearce, R. P., C.E.
Vynne, E., C.E.
Williams, D., C.E.

1911

Cleaver, T. G., C.E.
De Tar, De Los, E.E.
Doering, R. C., F.P.E.
Emmons, G. C., E.E.
Goldberg, D., M.E.
Gray, R. L., E.E.
Green, G. V., Ch.E.
Griffiths, F. H., M.E.
Morgan, C. W., M.E.
Salomon, M. J., C.E.
Schmidt, E. J., E.E.
Schultz, W. E., F.P.E.
Scott, P. J., M.E.
Wallace, E. L., E.E.

1912

Beach, W. E., C.E.
Bloomfield, J. C., E.E.
Enoshita, Toyozo, E.E.
Hazen, F. G., E.E.
Holtman, D. F., C.E.
Legel, J. G., Arch.
Lewis, Geo. D., C.E.
Meade, G. R., E.E.
Neufeld, Ralph, C.E.
Perrine, A. A., E.E.
Strale, Nels W., M.E.
Tyler, Alva W., E.E.
Yoshida, H. T., M.E.

1913

Arp, W. B., E.E.
Connell, Dan., Arch.
Cramer, A. C., C.E.
Ermeling, R. W., Arch.
Fryburg, W. E., E.E.
Furay, C. J., Arch.
Garrison, C., C.E.
Goldsmith, F. R., M.E.
Kopald, Chas., E.E.
Lucas, J. T., C.E.
Moore, F. L., Ch.E.
Munn, Wm. K., Ch.E.
Newman, Irwin, M.E.
Rothwell, R. F., C.E.
Stanley, H. C., Arch.
Westlund, E. G., C.E.

1914

Agazin, Toly, Ch.E.
Auer, P. F., C.E.
Barber, G. S., Arch.
Barr, A. W., Arch.
Boutter, C. L., C.E.
Case, H. L., E.E.
Cohen, Jos., Arch.
Cooley, G. S., M.E.
Eliel, A. G., Arch.
Grassby, G. A., Jr., M.E.
Jeddy, H. E., C.E.
Kann, W. H., C.E.
Lesser, D. B., Ch.E.
Meyer, L. C., M.E.
Morrow, A. W., Arch.
Oldenburger, W. C., C.E.
Pomerono, Joel, C.E.
Roberts, W. F., C.E.
Sevin, I. M., C.E.
Shane, Jas. L., Arch.
Smith, H. F., C.E.
Swanson, F. A., E.E.

1915

Bready, W. M., M.E.
Chamberlin, Jos. F., F.P.E.
Gersky, M., C.E.
Harman, E. S., M.E.
Hirose, Yoshisakee, Arch.
Hirschfeld, Leo S., Arch.
Hupp, O. R., E.E.
Johnson, V. E., C.E.
Mathues, H. J., E.E.
Mieczkowski, T. K., E.E.
Minchin, S. H., F.P.E.
Parrott, R. D., Ch.E.
Pierre, Edw. D., Arch.
Schiffers, E. A., Arch.
Shaffer, Sidney, E.E.
Stark, A. G., Arch.
Willson, H. E., M.E.

1916

Adams, Robt. S., C.E.
Apfelbaum, H. J., Arch.
Appelbaum, A., C.E.
Armstrong, F. C., C.E.
Bland, Henry, E.E.
Broman, J. G., M.E.
Eames, E. R., Arch.
Farrier, C. W., Arch.
Finkelstein, S. C., Arch.
Foy, Edgar A., C.E.
Harris (Katz), H. S., E.E.
Kinnally, R. W., C.E.
McHugh, L. J., C.E.
Miller, Jos. V., M.E.
O'Dea, Thos. M., Ind. Arts
Shapiro, H. M., E.E.
Sosna, Sam. E., C.E.
Sostheim, B. B., C.E.
Sullivan, Jos. E., E.E.
Wallbrecht, H. L., Arch.

1917

Cooper, E. C., M.E.
Durant, R. F., Ch.E.
Evans, Robt. T., M.E.
Fritze, Geo. M., M.E.
Hall, K. V., F.P.E.
Kendall, S. W., Ch.E.
Lewis, Geo. D., C.E.
Lucas, J. T., C.E.
Mellor, L. E., Arch.
Morse, R. L., M.E.
Prochazka, R. V., E.E.
Schreiberg, A. L., C.E.
Turner, J. W., Arch.
Vesely, W. J., Arch.
Zimmerman, A., E.E.

1918

Andre, Guy L., M.E.
Durham, Edw. J., M.E.
Erickson, R. A., E.E.
Huffaker, N. L., M.E.
Hullinger, O. M., E.E.
Jeddy, H. E., C.E.
Kerr, V. A., M.E.
Koehler, W. W., Ch.E.
Lewin, Edw. P., Arch.
Matthews, W. D.,F.P.E.
Rusk, R. H., F.P.E.
Smith, H. F., C.E.

1919

Cowles, F. S., Arch.
Dady, W. E., Arch.
Geldmeier, H. F., E.E.
Mintz, Chas. W., F.P.E.
Parrott, R. D., Ch.E.
Schimek, A. F., Arch.
Senescall, C., C.E.
Sosna, N. J., Arch.
Wallace, C. R., Arch.
Wilbor, J. B., Ch.E.
Wi'son, M. M., Ch.E.

1920

Adam, P. J., M.E.
Bloomberg, S., E.E.
Fainstein, M., C.E.
Frank, C.E.
Grodsky, M., C.E.
Karlson, Jos., Arch.
Peterson, H. C., M.E.
Podolsky, D. H., Ch.E.
Popkin, J. L., Arch.
Smely, Jas., E.E.
Sparling, D. C., Arch.
Stein, A., C.E.
Stevens, H. D., E.E.
Wong, Yuk Man, M.E.

1921

Bird, H. W.
Bloom, L. S., E.E.
Browde, A. M., Arch.
Hallett, J. A., M.E.
Kaplan, H., Ch.E.
Mann, H. A., C.E.
Maranz, Leo S., M.E.
Mundt, Edw., C.E.
Muramoto, D. K., E.E.
Naiman, J. M., M.E., E.E.
Newman, Dr. L., M.E.
Pearce, W. W., E.E.
Quinlan, F. D., M.E.
Winiarski, M. F., Arch.
Zahrobsky, G. J., E.E.

1922

Bradbury, G. V., M.E.
Conner, G. D., Arch.
Corydon, J., Jr., M.E.
Davis, A. A., Ch.E.
Gambal, J. J., C.E.
Gilbertson, G. A., Ch.E.
Herman, B. S., M.E.
Hochriem, F. G., E.E.
McCormack, W. J., Arch.
Paque, W. W., M.E.
Reinquist, P. A., M.E.
Reihmer, Leo L., M.E.
Rieger, Earl C., M.E.
Silverberg, S., Ch.E.
Watt, Jas. H., C.E.
Wing, H. R., E.E.

1923

Adler, Geo. H., E.E.
Clark, A. S., Arch.
Crane, W. O., E.E.
Downs, F. C., Ch.E.
Fisher, R. D., E.E.
Frank, Julian, C.E.
Goldstein, A., M.E.
Hauser, A. R., Arch.
Kramer, J., E.E.
Mandel, D. M., C.E.
Oboler, Max O., E.E.
O'Brien, W. H., C.E.
Pollan, H. T., M.E.
Radner, S., M.E.
Schwartz, M. L., E.E.
Skolnick E., Ch.E.
Sommers, L. H., Arch.
Trow, Robt. C., Arch.

1924

Anderson, H. E., Arch.
Andree, C. R., C.E.
Baim, E. E., Ch.E.
Bensinger, E. A., Ch.E.
Brown, M. L., C.E.
Faro, Robt. V., Arch.
Friedman, H. C., C.E.
Goodman, Wm., M.E.
Greenfield, Th., Ch.E.
Hart, Thos. H., E.E.
Johnson, E. A., Arch.
Hardwicke, L. C., C.E.
Lipsky, W. S., M.E.
Lowe, R., M.E.
Murner, H. K., C.E.
Nelson, Carl A., M.E.
Nikseh, H. E., M.E.
Samuels, Saul, C.E.
Solomon, Harry, C.E.
Steiner, K., Ch.E.
Swanson, E. J., Ind. Art
Vickers, W. H., M.E.
Walk, Edward, C.E.

1925

Baird, S. Allen, M.E.
Beck, M. D., Ch.E.
Cloose, J. H., M.E.
Gaylord, Robt. P., F.P.E.
Greenlief, J. S., M.E.
Johnson, J. G., Ch.E.
Latta, L. M., F.P.E.
McFaul, D. J., M.E.
Nicolai, A. E., Arch.
Norton, H. E., Ch.E.
Nudelman, C. F., C.E.
Ostland, R. F., C.E.
Rose, Geo., Jr., M.E.
Schwarz, E., E.E.
Stahl, J. K., M.E.
Stemwedel, A. L., E.E.
Webb, E. F., C.E.

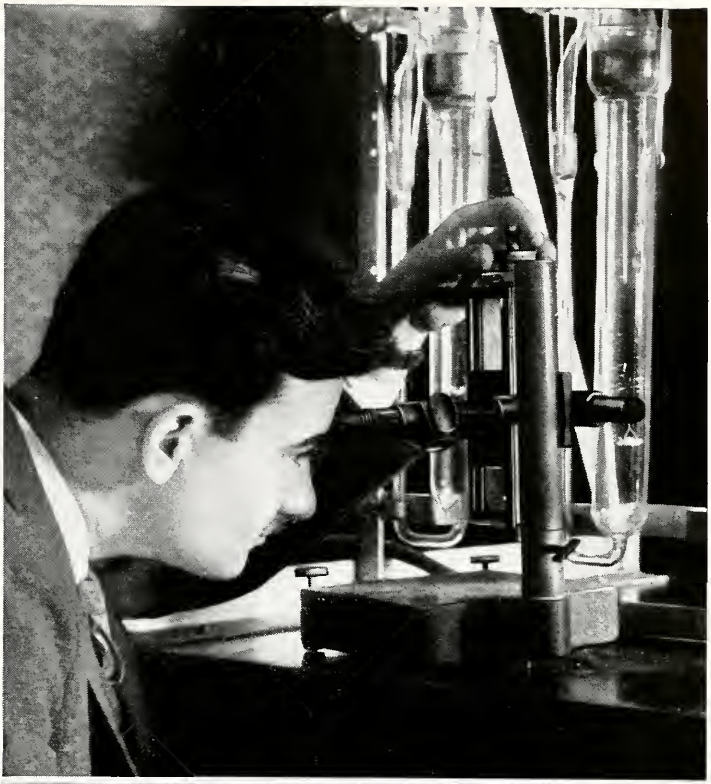
1926

Armit, Edw. A., Ch.E.
Baird, W. M., Arch.
Becker, Geo., Arch.
Blume, L. J., Arch.
Gambell, C. H., M.E.
Harris, H. McC., F.P.E.
Kleer, Chas. G., Arch.
Kormacker, F. J., C.E.
McLaren, S. J., Jr., F.P.E.
Melby, G. O., C.E.
Meyer, F. K., Ch.E.
Stiehl, D. R., M.E.
Zukowski, V. J., C.E.

1927

Barfield, N. D.
Berkson, A., Arch.
Camp, T. P., Ch.E.
Davidson, D. B., F.P.E.
Dickey, W., E.E.
Dunham, S., E.E.
Emerson, R. W., Arch.
Fraser, C. C., M.E.
George, H. R., Jr., M.E.
Gothard, W. W., C.E.
Hall, P. C., E.E.
Hanson, W. I., E.E.
Heinrich, R. L., M.E.
Heyes, A. B., E.E.
Johnson, L. F., C.E.
Jung, C. L., M.E.
Knapp, J. L., M.E.
Koeper, J. J., C.E.
Larson, E. A., E.E.
Lee, Geo. H., E.E.
Loeb, F. W., E.E.

(Continued on Page 20)



"Assets in the making"

THE work of Bell Telephone Laboratories might well be called "assets in the making." It deals with many problems whose solution will be of great future value to telephone users. ¶ The truth of this statement is indicated by improvements already developed and now in daily use. The convenient handset telephone, the dial system, new magnetic alloys, overseas and ship-to-shore radio telephony are just a few examples. ¶ Today more than 4000 men and women are carrying on this work to make tomorrow's telephone service still better.

Why not telephone home at least once each week? For lowest rates to most points, call station-to-station after 7 P.M. daily, or any time Sunday

BELL TELEPHONE SYSTEM

In the Limelight

Centrifugal dredge pumps, hydraulic dredging projects, and commercial installations for aggregate production have occupied the attention of BRADLEY SAYRE CARR since his graduation from Armour in 1916. Mr. Carr received his B. S. in Mechanical Engineering at that time, and in 1924 the Degree of Mechanical Engineer. The apparatus he devised for measuring the thermal conductivity of insulating materials in connection with his thesis work has been used in commercial laboratories for tests on commercial insulators.

B. S. Carr

In engineering he has long been identified with hydraulic dredging, his chief works placing emphasis on the design and installation of Amsco dredge pumps. In this connection he is manager of the Pump Department of the American Manganese Steel Company. Mr. Carr has also been consulting engineer on a large number of the hydraulic dredging projects connected with earth filled dams, sea wall fills, levee construction, land reclamation, and canal and channel excavation. Besides these purely dredging projects, he has also made many installations of equipment for the commercial production of sand and gravel. At present he is chairman of the Manufacturer's Division of the National Sand and Gravel Association.

While at Armour, Mr. Carr was active in social functions as a member of Theta Xi and Tau Beta Pi fraternities. He was also managing editor of the *Armour Engineer*.

What can a professor accomplish when he goes into business? Resigning in 1924 as associate professor of electrical engineering at Armour, after teaching for four years, C. E. STRYKER, B. S., '17, started working for the Fansteel Metallurgical Company as an electrical engineer. Then taking charge of the company's railway and industrial division, he sucessively became vicepresident and general manager of one of its subsidiaries, and finally chief engineer in charge of plant and product engineering, research laboratory, patent activities, and sales.

He held this post until the present year when he became associated with McKinsey, Wellington, & Company, who offer complete management engineering service in market investigation; engineering, organization, and management studies; financial analyses; and general surveys.

In addition to his bachelor's degree in electrical engineering, Mr. Stryker was granted the degree of E. E. in 1924. He is a member of Theta Xi and Eta Kappa Nu.

C. E. Stryker

Madden, E. H., E.E.
Mazzone, S. A., Arch.
Ohlinger, Leo O., C.E.
Schesch, Carl, M.E.
Uebele, Geo. F., C.E.
Verano, V., C.E.
Weinberg, Jos., E.E.

1928

Bacot, E. C., Jr., C.E.
Besch, O. R., F.P.E.
Brown, Robt. N., Ch.E.
Burke, H. V., F.P.E.
Gustafson, G. A., E.E.
Kapke, E. B., M.E.
Kratochvil, F. M., E.E.
Madden, T. A., Arch.
Marhoefer, L. J., C.E.
Miller, Leo, F.P.E.
Ogden, Tom, C.E.
Reitler, J. J., F.P.E.
Steiner, K., Ch.E.

1929

Craig, Chas. C., C.E.
Farrell, F. B., C.E.
Jillson, Chas. F., E.E.
Libanoff, Leo, C.E.
Montgomery, G. M., C.E.
Scheidemantel, H. B., Ch.E.
Schofield, B. R., E.E.
Sherman, E. J., F.P.E.
Swanson, A. P., Arch.
Turk, H. F., Arch.
Yount, J. R., Ch.E.

1930

Berg, E. W., Arch.
Cristensen, F. E., Arch.
Dobberman, M. R., Arch.
Erland, G. G., M.E.
Garen, D. R., M.E.
Fischman, L. H., C.E.
Goldenberg, E., Arch.
Goldman, J. R., Ch.E.
Haegele, A. C., F.P.E.
Rowley, Edw. R., M.E.
Sanborn, F. E., E.E.
Solstad, E. W., Arch.
Taylor, J. L., E.E.
Tell, F. O., Arch.
Thompson, J. K., Ch.E.
William, Robt. R., C.E.
Wood, M. B., C.E.

1931

Abramson, R. J., E.E.
Czerwecki, N. B., M.E.
Doane, T. W., Arch.
Dobson, C. E., Arch.
Crow, R. M., Arch.
Ficarratto, S. C., C.E.
Krause, Robt. M., M.E.
Minx, E. J., Arch.
Myers, K. H., E.E.
Rosen, N. R., Arch.
Streicher, Leo, Ch.E.
Wlekinski, T. J., Ch.E.
Yzaguirre, M. B., Ch.E.

1932

Bryant, E. L., C.E.
Cannell, S. D., M.E.
Casey, Jas. J., C.E.
Colcord, A. E., M.E.
Dirkers, J. B., F.P.E.
Fox, Chas. H., C.E.
Frye, Paul H., E.E.
Howes, Chas. S., M.E.
Hromada, F. M., C.E.
Kohr, T. F., C.E.
Matheson, D. R., E.E.
Miccucio, M. J., E.E.
Nordell, W. E., F.P.E.
Poe, Morris, Arch.
Stahm, Eli B., Arch.
Sugarman, I. A., Arch.
Tonsager, H. A., Arch.
Toopeekoff, E., M.E.
Viel, A. R., Ch.E.
Wichser, A. J., Jr., Arch.
Wierzbowski, A. E., C.E.
Wiltrakis, Ed. J., C.E.

1933

Baumann, W. E., C.E.
Belton, Geo. R., M.E.
Bodinson, H. W., F.P.E.
Buehne, W. G., M.E.
Clanton, C. N., F.P.E.
Hallen, Geo. K., E.E.
Hanrahan, Geo., C.E.
Holmick, A. H., Ch.E.
Jackson, Wm. D., C.E.
Kenner, E. C., F.P.E.
Krizan, L. W., Ch.E.
Luckett, T. D., Arch.
McLane, J. R., Arch.
Miller, J. H., Ch.E.
Moline, R. W., Ch.E.
Nelson, R. E., M.E.
Paine, F. W., Ch.E.
Pechman, J. R., F.P.E.
Plhak, Roy L., Arch.
Ream, Altus M., Ch.E.
Smethells, W. T., F.P.E.
Stienhuis, A. L., F.P.E.

1934

Bartlett, F. C., Arch.
Dobson, R. P., F.P.E.
Eberly, K., Ch.E.
Ellis, R. L., F.P.E.
Irion, T. H., Arch.
Markham, Ralph, C.E.
Novac, V. J., Arch.
Pfeifer, A. J., C.E.
Swanson, R. W., F.P.E.

1935

Morrison, J. K., F.P.E.

Museum

(From page 6)

of vehicles. In the Hall of Transportation will be included exhibits of historical and modern locomotives and cars. Full sized originals and replicas of famous locomotives, including a replica of Stephenson's "Rocket," will be exhibited here. Provision has been made for the suspension of airplanes, gliders, and free balloons from the roof trusses above this area. In the department of water transport will be historical and modern marine equipment, including a full sized 175-foot submarine used during the World War.

In the area assigned to Graphic Arts and Communication will be exhibits depicting man's long and laborious ascent from the period when the printer used a hammer and chisel to make type and a stone slab for paper; when no one worried about bringing home the evening news. A replica of Gutenberg's printing shop will be seen here. The progress of signaling from earliest times down to the modern radio-telephone will be shown by exhibits, most of which will be operable.

The concluding sequence in the Museum will be that of "Architecture and City Development." The development of the city from its earliest form of a group of crude cave dwellings to the modern metropolis, which uses as tools the multitude of industries and services familiar to our civilization, examples of which have already been touched upon. Neither the modern city nor a single one of its units, as for example, the skyscraper, would be possible without the utilization of steel, concrete, electric power, rapid transportation (both vertical and horizontal), water supply and sewage disposal, and many other products of today's industry and engineering; a fact which will be brought out in this section. Finally, city planning, its economic aspects, its modern problems of commerce, transportation, traffic, housing, and zoning will complete the story.

So much for the Museum as it will appear when completed probably in 1938. The 40,000 square feet of floor space now open contains approximately three hundred exhibits representative of science and industry. About one hundred and fifty of the group cover miscellaneous subjects, while the balance tell a complete story of coal from origin to utilization, with a full sized operating coal mine as the feature exhibit.

The miscellaneous exhibits include demonstration of electric arc welding, cutting of steel under water by the oxy-electric arc, as is done in marine salvage, tensile strength testing of materials, automatic die cutting, sorting and counting of materials by the photo-electric cell, smelting metal in the induction furnace, and the measurement of flow of liquids in pipes. There are a number of agricultural and dairy machinery exhibits. The principle of the cream separator is demonstrated in one exhibit and then a full sized operating commercial unit is shown separating a mixture made up of two liquids of different specific gravities. Among the basic science exhibits are the industrial X-ray equipment, stroboscope, transmission and focusing of sound waves and the transfer of momentum.

The exhibits are operable wherever possible and, in a number of cases, the operating cycle, which starts by the visitor pushing a button and stops automatically at the end of the cycle, is accompanied by a recorded voice synchronized with the operation, describing the purpose and operation of the apparatus. Every exhibit is labeled with an explanation of its purpose, method of operation, and, if an historical one, its part in developing the industry.

to do best. "Do I like to travel?" "Do I like to meet people?" "Do I like to take orders?" "Do I like to give orders?" "Do I like to make speeches?" "Do I like to teach?" "Do I like to figure?" "Do I like tough problems?" "Do I like to get my hands into things or would I rather keep them clean?" In fact, I would try to set down on this sheet of paper, which by now will be several sheets, my likes and dislikes in as frank and complete and candid fashion as was possible.

I would read it over again and again and re-order it, doing this at intervals of a week or two, adding each time those new ideas which resulted from my contemplation of those previously noted, and reconsidering decisions made temporarily in my earlier contemplations. Finally I would pick from these sheets those things which I did best, marshalling them in orderly engineering fashion into a synthetic picture of me. I am almost certain that the results would indicate what at that particular time I was best fitted to do. It should suggest not one, but a group of possible jobs. It will not be a definite picture which will distinguish between Standard Oil and Sinclair as possible employers, or between the B. & O. Railroad and the New York Central, but it should distinguish between railroads, cement, or department stores.

After I had reached this point, I would discover what firms in the United States employed that sort of individual. I would list all of these firms, securing the names of the officers, correctly spelled and initialed, and with correct titles. Then I would sit down again, and utilizing all I had ever learned about business English and letter writing, concoct a letter telling that I was graduating from Armour Institute of Technology, in June, and describing the job which my conclusions indicated would make me of most service to my employer. I would stress my desire to do this work rather than my desire to earn anything. I would not express any thoughts about "working up" or "progress." If my analysis shows me that I am fit to become a general manager, chief engineer, or chief draftsman, as it well and truthfully may, his own analysis of this fact will be more convincing to the employer. Just ask for a job close to the desk or office of the individual whom you some day hope to be.

Attendance for four years at an engineering school, no matter how vigorously or carefully one pursues the course, how high the standards, how excellent the instructions, how magnificent the record of grades or accomplishments in extra-curricular activities, all this, though it means much, does not make an engineer in the stricter sense of the usual definition, nor what may be called the broader sense of the definition I have tried to give here. Your conclusion after making such an analysis may be, though I hope it will not, that you are going to be a first-class floorwalker in a department store. But if that is your conclusion, and if after going over your analysis, again and again, you can find no other picture for yourself, you will make your life easier, happier, more comfortable, and complete if you decide then and there to be the best damn floorwalker there ever was.

One could hardly expect the freshman who enters college and studies highly specialized "practical" courses in the hope of quick returns to know which course best fits his ability. If he knew enough about the subject, or its possibilities after graduation, to make such a decision, he would not need to go to school. The student may find himself after four years of training "saddled" with an education. His analysis may conclude for him that he made a mistake in his choice of studies. If he took engineering, I can assure him he made no mistake. No man with his living to make could help being benefited by the training in science, facts, and logical thinking which is, basically, engineering.

Remember, though, that when you arrive at that great thing, the job for which you've been preparing not for four, but for twenty odd years, that your education and the fact of it are not going alone to maintain you in the job. In looking back on a long series of the business comings and goings I have seen, omitting those departures caused by dishonesty and the many varieties of intemperance, I can freely say that the greatest cause of failure is not lack of education or ability, but an unwillingness to work.

Edison, I believe, attributed inventive ability to a very small amount of "know" and a great amount of "sweat." I think that applies to the many routes to success in life. The employer hires you to work. Very few employers will whip and cajole you into doing it. When you don't work, most of them dismiss you. You won't find much of the pleading of an instructor to "get that laboratory work in that was due three weeks ago" in business.

If I were to sum up what a newcomer in business should do to get on

(Turn to page 24)

tional Co.; Republic Steel Corp.; Stewart Die-Casting Co.; Union Special Machine Co.; Whiting Corp., Harvey; and Western Electric Co.

The work actually being done by the students varies in the different plants. No attempt is being made to project the school into the factory, and the student is expected to devote his entire energies to his job during the work period. In most cases, the boys are working in the shop or in the engineering department. The executives of all cooperating industries are fully aware of the educational significance of the work periods, and consider these students as potential engineers and executives, so that during the five year period the student will obtain a variety of experience in industry. Records show that in other cooperative plans about sixty per cent of the students remain with the industry in which they receive cooperative training, after graduation. It is reasonable to suppose that among these students of today will be found some of the industrial leaders of tomorrow.

Considerable detail work has been necessary to put the new cooperative plan into effect at Armour Institute of Technology. This type of program was first suggested nearly a year ago by Gen. Thomas S. Hammond, a member of the Board of Trustees, President of the Whiting Corporation, and President of the Illinois Manufacturers Association. Preliminary explorations among the industries made last spring indicated a considerable interest in the plan. The work of actually turning the plan into a reality was begun in November, 1935, and a committee of the faculty, headed by Professor J. B. Finnegan, began receiving commitments from cooperating companies and interviewing applicants for the new course. Gen. Hammond assisted by calling a meeting of a number of manufacturers who were members of the National Metal Trades Association, and L. J. Lease, formerly vocational director of Thornton Township High School, was appointed a member of the faculty of the Mechanical Engineering Department, to serve as coordinator between the school and the industries. Nearly two hundred applicants for the course were given personal interviews by members of the faculty, and the successful ones were sent for additional interviews by the cooperating industries before final acceptance in the course. The five-year cooperative course is a part of the work of the Department of Mechanical Engineering, of which Philip C. Huntly is Director.

Jobs

From page 22)

that famous ladder which has so many scrambling, fighting ants at the bottom and so much room at the top, I would say, first, WORK. Second, don't stay in a job where there is chicanery in the business, where you can't trust the boss, and they dock you for every holiday. Third, note the jobs of other people in the concern—are there jobs here which will satisfy you? Fourth, see that the concern is not a family affair where sooner or later some usually incompetent cousin of the boss is going to squeeze you out or take the job ahead that is rightfully yours. Fifth, be respectful toward your employer, and keep your character always a little better than your friends expect it to be.

If you do that and have a little help from fortune, you may even exceed your present desire for future accomplishment. You more probably will eventually level out in a position where you may gain happiness and contentment, admitting your limitations, yet not forgetting that you have always the opportunity of pushing out those limitations through further self-analysis and study.

New Metals

(From page 10)

tantalum for such use over all other materials. Columbium also bids fair to prove itself highly valuable for the construction of vacuum tubes for high-power duty. It has the lowest work function of any pure refractory metal; that is, less energy is required to remove an electron from its surface than from that of any other refractory metal. There is world-wide interest in columbium, for if present indications hold true this metal might permit the construction of tubes handling thousands of kilowatts instead of tens, as at present. The greatest interest in tantalum results from its remarkable resistance to acid corrosion. Except for strong alkalies, hydrofluoric and fuming sulphuric acid, tantalum may be said to be chemically inert. It is not attacked by hydrochloric or nitric acids, by aquaregia, or by wet or dry chlorine at ordinary temperatures. It has to be protected from gaseous hydrogen which it absorbs avidly at elevated temperatures forming a brittle hydride. At higher temperatures it combines readily with oxygen, nitrogen, in fact with all ordinary gases and with carbon.

The production of these metals on a commercial scale is expensive and has become practicable only through a new technique, the so-called "Powder Metallurgy." The melting points, as noted is excessively high. At these temperatures they would combine with every other substance, and there would be nothing in which they could be melted. They are produced, therefore, without ever being molten, in a similar manner to a very ancient method of producing iron, as will be noted below. The metals are produced as a finely divided but crystalline powder precipitate from a fused electrolyte of fluorides by an electric current. The purified powders are pressed into bars and heat treated by the passing of an electric current heating them by resistance. This has to be done under a high vacuum because of their affinity for the atmospheric and other gases. By a process of swaging and forging, followed by more heat treatment, they are finally caused to recrystallize into sound bars. These metals possess good welding properties, and the grains are literally welded together by this treatment.

This Powder Metallurgy technique is now being applied to other metals, in fields of the older metals, such as copper; and many new mixtures are possible. Oilless bearings (so-called) are made this way. (A porous sintered mass is made from a mixture of

powdered copper and graphite which is quenched in oil which penetrates the mass by capillary attraction completely saturating it.) Such a bearing is practically everlasting as it furnishes its own oil.

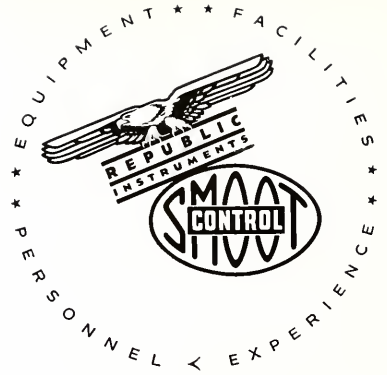
Hundreds of miles of tungsten filament wires can be drawn from a single bar of the metal made in this way. This draws attention to its high purity. It is believed by metallurgists that all metals when completely pure will prove to be ductile. This has been recently proved even in the case of vanadium, which only comparatively recently has been obtained in a purified form.

In spite of its almost unbelievable resistance to corrosion, tantalum is very malleable and ductile, and can be formed into the most intricate of scientific apparatus for research purposes. It has high tensile strength which, coupled with its resistance to corrosion, makes it unnecessary to use any factors of safety. Tantalum's "value action" in rectifying alternating current when it is used as an anode in a battery circuit—is so well known as hardly to require mention.

Another of these "new," meaning "rare" metals is molybdenum. Contact points of this metal have been installed by several of the railroads in recent years replacing silver which was formerly used for telegraph keys, signal relays, etc. They last fifty times as long and require much less attention from the operators. The contact points in automobile distributors are usually of tungsten, because it is harder and less costly. Formerly, these were of platinum. The tungsten points do as well and are much cheaper. There is now a regular technique in producing these contact points known as "Contact Metallurgy."

The greatest field in the future of metallurgy is in that of alloys. The Bureau of Standards at Washington, D. C., would send on application a list of several thousand of these mixtures which are usually known by special names. A well informed metallurgist will know only a few of these and their properties. Many of these mixtures are patented. There is going on a wonderful development in the field of non-ferrous alloys, and the possibilities seem almost unlimited. Recently a well known metallurgical engineer in addressing a graduating class of metallurgists at a technical school gave them the advice: "Go Non-Ferrous Young Men."

In ferrous metallurgy, the development is so complex and rapid that it is hard to keep abreast of it. Many

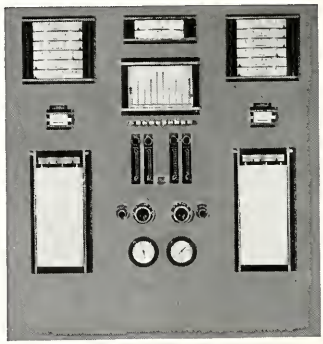


REPUBLIC · SMOOT SERVICE IS *Complete*

covering every aspect of control and measurement in the modern boiler room

The Republic Flow Meters Co. offers for the first time a service that embraces **all** phases of regulation and measurement as a part of **complete boiler room control.**

In rounding out our facilities and line of products we have had in mind one very important point: that boiler room control divides into two separate and distinct parts . . . the mechanical control equipment necessary to operate boilers, stokers and auxiliaries efficiently . . . and the instruments which witness and record the operation of both individual units and the plant as a whole.



Centralized Republic-Smoot master control and individual control panel for an entire central station boiler room. Instruments include Republic Multi-Point Indicators of flow, CO_2, stokers speed, drafts and pressures. Republic Strip-Chart Recorders provide records of all essential functions.

Our newly expanded facilities and engineering staff are placed freely at your service whether your problem involves a single instrument or modernized control of an entire power plant. This service is available, to power engineers and executives, through a nationwide organization of sales and service engineers. Your inquiries are invited and will imply no obligation on your part.

★

REPUBLIC FLOW METERS CO.
2230 DIVERSEY PARKWAY · CHICAGO · ILLINOIS

of the new products seem almost miraculous.

None of the new automobiles now being built could have existed fifteen years ago. High speeds, light but very strong construction, noiseless engines, dependable brakes are all the gift of the new metallurgical sciences. The alloys used in automotive parts are in very truth "New Metals."

The new high speed trains, like the Zephyr, attain their high speeds because with stronger metal they can be built lighter. Today the dead weight drawn in the steel cars by the railroads could be replaced with lighter stronger steels and still carry the same amount of freight.

Anyone connected with the Armour Institute of Technology could not write about the new metals without mentioning the great work of the Fansteel Metallurgical Corporation of North Chicago and the contributions of Dr. Clarence W. Balke, possibly the greatest of the non-ferrous rare-metal experts of our time. Many of the notes and quotations in this article have been taken from their publications and from an article by Dr. Balke in *Industrial and Engineering Chemistry* for October, 1935. The founder of the Fansteel Corporation was a former graduate of Armour Institute of Technology, and many of the experts employed there are Armour men.

The field of the light alloys used in aeronautical construction is in a domain by itself. Aluminum now has a complicated heat treating technology applied to its alloys so well worked out that it requires a specialist to understand it all. One of the alloys of aluminum led to one of the great spectacular discoveries in metallurgical practice—the so-called "precipitation hardness" which, first noted in connection with duraluminum, has been widely applied to other alloys and to ferrous metals, with outstanding results. These alloys after heat treatment and machining and working, when laid aside for a while will grow in strength and hardness. This is called "Age-Hardening."

Allied to this are the new alloys of aluminum and magnesium now well established on the market and known by the name of the company that has developed them, "Dow Metal." This material has many intriguing properties and probably will have a good future.

There is a challenge in the production of this metal. Among the materials of the earth's crust, aluminum is the third most abundant. Magnesium is far more abundant than many metals such as copper or zinc. Every bed of dolomitic limestone is a poten-

is rich in

Dextrose, the Food-Energy Sugar

America's most delicious and wholesome dessert

Pressed from the hearts of fully ripened, golden corn kernels, MAZOLA is a pure, wholesome, nutritious salad oil—excellent for cooking too

Convenient and economical
A great help to busy housewives

tial source of magnesium metal. The possibility of winning magnesium from such deposits or from the far more scarce but still abundant magnetite deposits is a possibility, the problems of which when solved so as to produce the metal cheaply, will lead to new uses and construction.

There is berylium, one of the lightest, hardest, and strongest of the metals. It is now obtainable in alloys with copper to which it gives some rather startling properties. There is a crying need for some process of concentrating the berylium minerals which are often present as a constant constituent in many granites. The percentage in the aggregate is very low, but the amount, once a cheap method of concentration were had, would be capable of meeting all possible demands.

The metallurgist would like to defend the thesis that civilization could not have arisen until mankind had learned to obtain and use metals. He knows that all, even the most ancient civilizations, must have been based on the use of tools and that most likely these tools in part, at least, were made of iron. As a metal, iron, on this planet, is bound to be evanescent; and, given time, all of our great stores of iron in our buildings and machines would disappear. Brass and bronze implements of the older times have come down to us because they resist corrosive destruction, but not so the iron tools. Iron can be reduced from its ores without melting at a very low red heat easily within the powers of Neolithic man with his charcoal fires, and man must have discovered this long before he learned to melt copper and tin and produce brass which seems a more complicated metallurgical process. The product would be "sponge" iron when pure "iron-stone" or hematite, which is widely distributed over the surface of the earth is heated in a charcoal fire. This has only to be forged and welded together to make first class iron. This is analagous to the new "powder metallurgy" and is certainly very ancient practice. Heavy stone hammers could be used for the forging while by reheating the metal in the charcoal to make it soft enough for more pounding, it would gradually absorb enough carbon to give it a good, hard, sharp edge. It would get stronger with every heating. Quenching would often occur to cool the iron, and it would soon be noticed that the iron carbon alloy was hardened in this way. Such quenching, however, would soften copper and brass; hence, the distinction between iron and brass in the above reference to Tubal Cain.

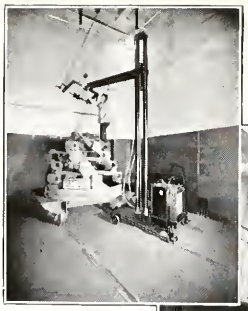
The iron structures of our modern

times will not last as have the great stone structures of the ancient Greeks and Egyptians. Our best and most enduring structures are of stone, artificial stone like the great Boulder Dam. The cement and concrete people speak of a new stone age to succeed the iron age in architecture, using stone that can be moulded and formed into place.

This is bringing about the attempt of the metallurgist to produce new alloys that will resist the destructive influences of the atmosphere. Hence the stainless steels and the claims of its durability.

Really to accomplish this we shall have to make our structures out of gold or platinum or of tantalum. For that we shall have to wait until the chemical engineers tell us how to convert our aluminum and iron into these metals. Then the alchemists, who were the earliest of the modern metallurgists, will come into their own. There are, however, many new and wonderful alloys with increasingly valuable properties, and doubtless more will be developed.

X-RAYED



Exposure room, showing X-ray tube stand — indicating flexibility of apparatus.

Exterior view — AMSCO X-ray Laboratory.

Control stand, looking toward machine room.

To Insure Sounder Castings!

The last word has not been said in more closely adapting metal compositions to definite service conditions. Neither is it impossible to improve standards of design, foundry procedure, and heat-treatments of alloy steel castings so that they will more efficiently and economically serve their intended purposes.

But so much has been accomplished in these fields that the AMSCO Research Department has turned its attention to another and more pressing problem — that of giving the user of AMSCO Manganese Steel or AMSCO Alloys, castings of such reliable soundness as will enable the alloy steel to develop its potential efficiency and economy to the greatest extent.

With the visual evidence given the engineer and foundryman by the X-ray of internal defects otherwise not identifiable, problems of design and foundry method are sooner or later solved. This scientific tool enables the establishment of standards that result in commercially sound castings being consistently produced, fully adequate to the intended service requirements.

This expensive equipment will pay for itself in greater economy both for AMSCO and our customers. To avail *yourself* of these benefits, insist that your Manganese Steel or Nickel-Chromium Alloy Castings shall be AMSCO made.

AMERICAN MANGANESE STEEL COMPANY
Division of American Brake Shoe & Foundry Company
401 East 14th Street, Chicago Heights, Ill.
Foundries at Chicago Heights, Ill.; New Castle, Del.; Denver, Colo.; Oakland, Calif.; Los Angeles, Calif. • Offices in Principal Cities.

AMSCO
TRADE MARK REGISTERED

1/3 Reduction IN ASH in PEABODY Superior Processed COALS

S SUPERIOR MAJESTIC PROCESSED P

S SUPERIOR BLACK ARROW PROCESSED P

S SUPERIOR GAYLE PROCESSED P

S SUPERIOR HAWTHORN PROCESSED P

Peabody's *Superior Processing* increases amazingly the efficiency of coal. This new method of cleaning and sizing completely removes all ultra-fines and free impurities, resulting in . . .

1. One-third lower ash content.
2. Increased B.t.u. value.
3. Elimination of pyrite.
4. Uniform air distribution throughout the fuel bed.
5. Elimination of fly ash.
6. Constant uniformity of sizing.
7. Elimination of all tramp metal.
8. Accelerated pick-up, all the way from banked fires to peak loads.

Peabody's *Superior Processed* Coals are breaking records for economical steam production. Whether your requirements be large or small, it will pay you to investigate the unusual possibilities of S-P Coals. There is a correct size and grade for every plant.

PEABODY COAL COMPANY

CHICAGO · NEW YORK · ST. LOUIS · CINCINNATI · SPRINGFIELD · OMAHA · DAVENPORT · MINNEAPOLIS

— and Chesterfields are usually there

..they're mild and yet They Satisfy

MAY 1936

Armour ENGINEER and Alumnus

SOUVENIR NUMBER

All that glitters is not PABST

THE real test of beer goodness is flavor. Convinced by this test—millions of Americans—from Detroit to New Orleans—from Los Angeles to New York—have made Pabst TAPaCan their choice for beer.

Purity, wholesomeness, refreshment and smooth, satisfying flavor is brewed right into Pabst Export Beer. Backed by 92 years of experience, combined with scientific laboratory control, you now get Pabst Beer—just as Pabst made it. Sealed in, fully protected, tamperproof, non-refillable, you get Pabst with all its delicate goodness captured at the brewery and maintained for your enjoyment.

Join the millions who have discovered this real brewery goodness. But—remember, *all that glitters is not Pabst*—call for your beer by name—Pabst TAPaCan.

Old Tankard Ale

Enjoy Genuine Old Tankard Ale—full bodied, full flavored, full strength. Brewed and mellowed by Pabst.

INSIST ON ORIGINAL PABST TAPaCan

- Brewery Goodness Sealed Right In
- Protected Flavor
- Non-Refillable
- Flat Top—It Stacks
- Saves Half the Space
- No Deposits to Pay
- No Bottles to Return
- No Breakage

PABST *Export* TAPaCan BEER

BREWERY GOODNESS SEALED RIGHT IN

G-E *Campus News*

"DON'T TALK BACK"

YOU can't argue with an officer. One G-E engineer learned the truth of this modern proverb when he was detained by Panama Canal authorities and the radio tubes he carried were impounded. The officers were convinced that the unfamiliar objects were bombs. And when an officer has made up his mind, that settles it. The tubes were carted away.

Some years ago, I. R. Weir, of the General Electric Radio Engineering Department, was en route to Tegucigalpa, capital of Honduras, Central America, to install a radio transmitter. He carried with him two of the first large, part-metal radio transmitting tubes which had been developed by General Electric.

"Upon arriving at the Panama Canal," he relates, "I was surprised to find that I was detained for investigation on suspicion of carrying bombs. After much argument it was decided that I should have to leave my radio vacuum tubes in the ammunition dump during my stay in the Canal Zone."

CLEAN DIRT

SOAP and water will still be needed to clean Junior's face and hands, but if Junior's father is a florist he will welcome this clean dirt.

Florists and specialty growers wage a never-ending battle against weeds, insects, and plant parasites which flourish in greenhouse soil. But reinforcements have arrived. Clean dirt may now be economically obtained by means of electric equipment developed by General Electric scientists.

Electric heating units, arranged in a wooden bin, heat a quantity of soil to a temperature of 160-180 F. Heating sterilizes the soil by a process which resembles the pasteurization of milk, and weed seeds, insects, and fungi which are dormant in the soil are killed during the sterilization process. In the resulting germless dirt, plants can attain a vigorous, uniform growth, free from the competition of weeds and the inroads of other plant enemies.

"AH, WATSON, AN INDUSTRIAL CRIME"

THE "corpus delicti"—a broken resistance wire; the suspect—a defect in the wire; the detective—a microchemist. With microscope and analytical apparatus of incredibly small dimensions this industrial superdetective finds tiny crystals of sulphate near the break. The trail leads to a nearby furnace giving off sulphurous fumes. Thus the wire is cleared of suspicion of having been defective, and the criminal fumes are eliminated.

This analysis is typical of many industrial "micro-mysteries" that have been solved in the Research Laboratory of General Electric. A development from methods devised in the fields of biology and medicine, microchemistry has become an indispensable servant to industry, with accomplishments as great as the quantities with which it deals are small.

With thimble-sized beakers, and test tubes as small as 1/50 of an inch in diameter, the microchemist analyzes quantities of material 17,000 times lighter than a drop of water. He has defined a new unit of mass, the gamma, one millionth of a gram. A streak of dirt, a smudge, a minute pit mark—all these can be taken into the laboratory with a reasonable assurance that the microchemist will be able to provide the answer to the problem.

96-257DH

GENERAL ELECTRIC

LETTER ... BOX

Voice From the Grave

837 S. Fourth St.,
Aurora, Ill.
March 28, 1936.

Dear Sir:

This is a voice from the "grave." Please be advised that yours truly resides at 837 S. Fourth St., Aurora, Illinois, and wishes his name deleted from the list of lost alumni.

Sincerely,
JEROME B. DIRKERS, F.P.E. '32.

The Lost Is Found

200 West Lawrence Avenue,
Springfield, Illinois.
March 26, 1936.

Dear Sirs:

I have been informed that my name appeared in the last issue of the Armour Engineer under the "Missing" column. I did not know that such was the case or I would have informed you of my correct address before this, but I have heard no word from Armour since my graduation, and consequently did not know that such a record was kept.

Yours very truly,
W. E. BAUMANN, '33.

Colcord Settles Down

San Francisco, Calif.
March 27, 1936.

Sir:

Since 1932 my experiences have varied tremendously. After graduation in June, '32, I worked for General Electric Company in Chicago selling electric refrigerators—up until my mother died July, '33. Then I packed up all my stuff and spent several months at Boulder Dam, in the engineering department of Babcock & Wilcox—fabricators of the 30' diameter 27/8" thick rolled steel penstocks and some smaller ones 25' diameter and 4" thick walls. It was some job, about 140 degrees in the shade—windy and dirty. I was almost killed twice, so quit that place, coming back to Chicago. Incidentally, I made the trip out there on a Harley-Davidson motorcycle I bought for $300. Sold it at the Dam for $200 cash—after having ridden 8,000 miles across the United States in about 4 months' time.

The next trip out West was to California, where I attended the Graduate School of Business at Stanford University. By the way, the credits which were sent to Harvard at one time were accepted, but I prefered the West to the East.

I was connected for a summer job with Libby McNeil in southern California and was the chief engineer of a cannery where we canned orange juice and tomatoes.

My job ended there (didn't like it anyway), and soon I was headed back East again by way of Texas. I arrived in Detroit, bought a new car, and spent time visiting around Michigan. After four months there, I was married and off on a trip back to the West via Havana, Cuba, and Panama Canal from New York City. I am located permanently now in Oakland, California, where I am in the Life Insurance business with The Northwestern Mutual Life Insurance Co. of Milwaukee. This is permanent.

Most cordially,
ED COLCORD, M.E. '32.

More Later

Medellin, Colombia, S. A.,
April 17, 1936.

Dear Sir:

In response to a card received some time ago, I am forwarding to you the information requested thereon.

I am employed by the RCA Manufacturing Co. as representative for RCA products in Colombia and technical representative for Central America and northern South America. I am married and have a daughter a year old.

I expect to be here for about three years and to spend about three-fourths of my time traveling about the country. The job varies from selling transmitters and photophone equipment to governments to handling service problems in connection with radio instruments. Records are a part of the RCA line, too, and it is a lot to ask of an engineering graduate to understand musical tastes of a foreign race of people. However, it is exceedingly interesting and a great builder-upper as far as experience goes.

As soon as I can get a little spare time I will print some of the several hundred films I have taken in my travels here. Then you can have a few to see just what this part of the world looks like.

Yours very truly,
J. C. HARROWER, C.E. '27.

Somebody Appreciates the Trustees

Daily Times,
Chicago, Illinois,
April 4, 1936.

Gentlemen:

Thanks for the October and December, 1935, issues of the ARMOUR ENGINEER AND ALUMNUS. *The feature, "Meet the Trustees," is of particular value to our reference room, containing good biographical material.*

May I request an additional copy of each issue? This is necessary for filing purposes. I would also appreciate being placed on your regular mailing list.

Very truly yours,
RALPH R. REED, *Librarian.*

An Engineer Is Everything

Santiago, R. D.,
March 10, 1936.

Dear Sir:

For the past several months I have been far removed from anything pertaining to the phase of electrical engineering, as we have been constructing a waterworks complete, serving a town of 15,000 inhabitants, 42 kms. from the pumping station. This will verify my statement to you last summer that I was everything from a General Manager down to a collector, as that seems to be the trend in this foreign public utility field, which makes it one of the most interesting professions, especially to me, as I certainly get discouraged with routine.

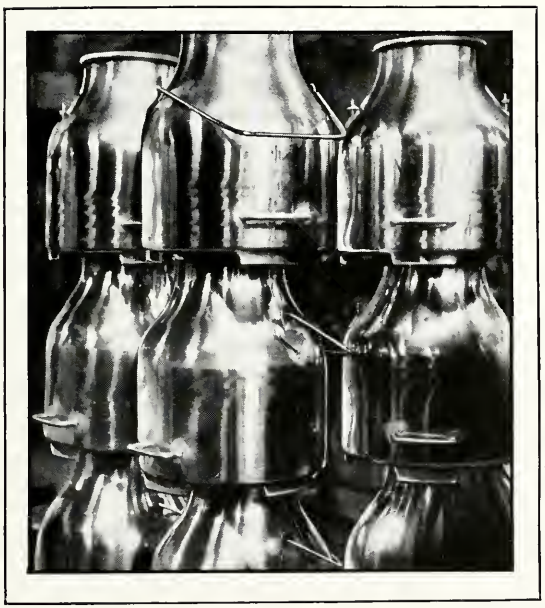
Very truly yours,
E. S. GEIGER, E.E. '29.

Better . . because IT'S WELDED

● The modern milk can is better because it's welded. Whether the can is made of aluminum or stainless steel—from the standpoints of cleanliness, sturdiness and serviceability—it is easy to see why the use of welded joints is beneficial.

Welding has made many good products better—milk cans, automobiles, airplanes, radios, refrigerators, streamlined trains and a thousand other things. This modern method of manufacture is applicable to the widest range of materials—steel and iron, aluminum, copper, brass and all other alloys and metals, even platinum. It is ideal for use where strong, smooth, invisible joints are necessary for enameling, for cleanliness or for appearance.

Tomorrow's engineers will be expected to know how to apply this modern metal-working process. Several valuable and interesting technical booklets describing the application of the oxy-acetylene process of welding and cutting in design, construction and fabrication are available from Linde offices in principal cities. Write The Linde Air Products Company, Unit of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York, N. Y.



Everything for Oxy-Acetylene Welding and Cutting

LINDE OXYGEN • PREST-O-LITE ACETYLENE • OXWELD APPARATUS AND SUPPLIES FROM LINDE UNION CARBIDE

PRODUCTS OF UNITED UCC UNION CARBIDE AND CARBON CORPORATION

Zwiers Helps Out

Frankfort, Indiana.

Ye Ed:

Three cheers for the brainstorm someone had about keeping the alumni informed about the doings of A. I. T. through the Armour Engineer and Alumnus. *I hope that others have found it as interesting as I have, and that the magazine will continue to make its appearance.*

Looking over "Missing Men" in March issue, I found a few names which I might be able to give you a little information on.

. . . . . .

As for myself, I've been very much the traveling man for the past year and a half. For that period of time I have been resident construction superintendent for Montgomery Ward & Co., and where I hang my hat has been my home. I'm just finishing up a new store here in Frankfort, and in the next few days will move on, destination still unknown.

Let's have some more of these newsettes about the alumni. I'm sure that many others have found them as interesting as I have. I guess that each of us has wondered at times what has happened to our classmates back in the good old days when we attempted to gather learnin' at A. I. T.

J. R. Zwiers, C.E. '27.
8228 *Justine St.,*
Chicago, Ill.

From Ellington, '08

1507 *Stroh Building,*
Detroit, Michigan,
September 19, 1935.

Sir:

Following graduation in 1908 *I was engaged with contracting firms in Chicago and Illinois areas, then came to Detroit in* 1912 *as Plant Engineer for The Stroh Brewery Company and remained with them until* 1916, *during which time my work involved a diversified line of structural, architectural, and plant engineering work and afforded me an unusual experience in the brewing industry which has since proved very valuable. Although I graduated in Civil Engineering, I found my duties involved mechanical, architectural, electrical, and even chemical.*

Upon completion of my work at Stroh's, I was retained as Construction Manager of the Book Estate until 1919, *during which time I constructed two large office buildings for them and maintained and operated their* 17 *other properties. In* 1919, *I entered into business for myself in the practice of Architecture and Engineering, under the firm name of Glover, Dinkelberg and Ellington, and this firm did a considerable amount of industrial and commercial work in the Detroit area. In* 1923, *the firm was dissolved, and I became a partner of Weston and Ellington, Architects and Engineers, who pursued for a period of ten years a general practice largely involving industrial, commercial, and institutional work; and we did many millions of construction, including hotels, office buildings, homes for aged, hospitals and nurses' homes, orphanages, and miscellaneous plant and industrial work.*

Upon the death of Mr. Weston I formed the firm of Harley & Ellington, Inc., Architects and Engineers, and have continued as its President since inception. We likewise are engaged in the general practice of architecture and engineering, although during the past 2½ *years our volume of work has been identified with brewery engineering work. We have completely designed, constructed, and placed into operation the Goebel Brewery of Detroit, which is one of the outstanding successful plants of the country, and we have continued to serve the Stroh Brewery and now have under construction for them one of the largest Stockhouses in America. We also have work in New York City. In addition, we are carrying on a considerable quantity of manufacturing building construction work, and other projects.*

With cordial good wishes, I am
Sincerely yours,
H. S. Ellington, C.E. '08.

A. I. T. Recognized in New York

March 23, 1936.

Mr. Walter L. Filmer,
care of Bell Telephone Laboratories,
New York City, N. Y.
Dear Mr. Filmer:

I understand that you are interested in the status of Armour Institute of Technology with the Department of Education and Registration in New York State.

The courses of study at Armour were officially registered with this Department in December, 1935, *and if you make your application at this time it will go through without any difficulty. The reason why the Institute had not been registered is that no application had been made until* 1934. *This also accounts for the fact that the Institute is not listed in the booklet published by the Department of Education for* 1935. *I shall be glad if you will inform any other Armour alumni in New York who may be interested.*

With very best regards,
Very truly yours,
H. T. Heald, *Dean.*

If Only YOU Would Do as Douglas Did!

Lake Forest, Illinois,
March 18, 1936.

Sirs:

In order that you may be aided in your search for the "Missing Men" listed in your March issue, I submit the following information regarding several of them.

. . . . . .

As for myself, having forsaken the windjamming activities of my youth (there may still be a few who remember my horn-blowing days at the institute), I am now engaged in a general practice of Engineering and Surveying in this, my home town; am married and have a son, Donald Bruce, who is 2½ *years old.*

It is always interesting to me to learn of the whereabouts and activities of former associates, and I hope that you will continue to print information of that nature. With best wishes for the continued success of your publication and the Institute, I am,

Yours very truly,
W. B. Douglas, '24.

Re Peebles' Article

Berkeley, Calif.,
December 27, 1935.

Dear Editor:

I read with interest the thoughts expressed in Professor Peebles' article in the Nov.-Dec. issue of the Armour Engineer and Alumnus.

I have been out of Armour almost sixteen years, and as a result of my experience, I think the most important thing in any work we might take up is the human relationship. This holds whether we work for a small company or a large corporation, whether we are in sales or production.

As engineers, we are apt to forget this phase of our problem. We are prone to think in terms of exact statements of loads and rated capacity, and are apt to lose thought of that invisible factor of the other person's mind. Dean Monin often brought this variable quantity into his lectures on psychology, and I often reflect on the wisdom of his words.

Yours truly,
Maurice M. Jackson, M.E. '20.

Dear Sir: *April* 27, 1936.

I am indicating below certain information regarding George Kleinert, '28, *which you may desire to publish in the next issue.*

George graduated from Armour in 1928, *with the degree of Bachelor of Science in Electrical Engineering. He was a member of Eta Kappa Nu and Sphinx.*

Then he attended John Marshall Law School, from which he graduated in 1932 *with the degree of Doctor of Jurisprudence. He was a member of Delta Theta Phi law fraternity. Prior to his death, he was practicing as a Patent Attorney, and was admitted to practice in the United States Patent Office and in the Federal Courts.*

George Kleinert died on April 8, 1936, *and was buried at Waldheim Cemetery on April* 11, 1936. *He is survived by his wife, Bertha Kleinert, and two daughters and one son.*

Sincerely yours,
George von Gehr, E.E. '28.

ARMOUR ENGINEER and ALUMNUS

MAY 1936

VOLUME 1 NUMBER 4

IN THIS ISSUE

Published in October, December, March, and May, in the interests of the students, college, and alumni of Armour Institute of Technology, under the direction of a Managing Board, consisting of D. N. Brissman, H. P. Dutton, W. Hendricks, D. P. Moreton, chairman, and F. X. Popper at 3300 Federal St., Chicago.

Some Rare Books On Mathematics

■ ■ ■

by W. C. Krathwohl, Ph. D.

Professor of Mathematics

AT a mathematical exhibit held recently in Chicago, a collection of rare mathematical books lent by Armour Institute of Technology attracted an unusual amount of attention. Some of them date from the sixteenth century and are constantly referred to by historians writing on this period.

The books were selected either as illustrating the type of textbook used by students in the Middle Ages and the Renaissance or as marking milestones in the progress of mathematics. They were:

William Barton, *Arithmeticke Abreviated* (1643).

Severinus Boetius, *Introductio in Libros Arithmeticos* (1522).

Rafael Bombelli, *L'Algebra* (1579).

Johann Buteo, *Logistica* (*Arithmetica vulgo*) (1559).

Edward Cocker, *Decimal Arithmetic* (1713).

John Dee, *Euclid* (1570).

Frisius Gemma, *L'Arithmetique* (1585).

Robert Record, *Arithmetick or Ground of Arts* (1658).

Michel Rolle, *Traite d'Algebra* (1690).

Francisco Vieta, *Opera Mathematica* (1646).

If an Armour student were to compare his textbooks with those used by a student in the Renaissance, he would find several marked differences:

1. Few textbooks were written in the vernacular, and it would be impossible for him to make any progress in his studies unless he possessed a thorough knowledge of Latin.

2. A great deal of material found in present-day textbooks was not even in existence at that time.

3. Many subjects, such as algebra and geometry, now taught in the high schools, were reserved for the universities. Even as late as 1778, elementary algebra was considered a sophomore subject at Harvard.

The book by Vieta is unique because it was owned by Isaac Barrow, the teacher and predecessor of Sir Isaac Newton at the University of Cambridge. In addition to the autograph of Isaac Barrow, it contains notes in his handwriting in the margins. These are extremely interesting, because they were made during the transition period of our present exponential notation. In one margin Barrow uses the old notation and writes "x cub" but in the margin on the opposite page he writes "x^3." Similarly in one margin is found "x qq," and in the margin on the opposite page its present day form of "x^4." It is interesting to note that nowhere, either in the text or in the notes, is the square of x written as x^2. It is always written as x quad.

Barton's book on arithmetic illustrates the difficulties a student of the Renaissance had with multiplication and division. Anyone who could do multiplication was considered a mathematician, and a person who could do division was considered a genius. No one was supposed to know the multiplication table above 5×5.* When necessity arose for multiplication by two digits each greater than 5, a rule called "Regula Ignavi" was used. This consisted of the identity $(5+a)(5+b)=(5-a)(5-b)+10(a+b)$. The rule was not used in its algebraic form, but was expressed in terms of the open and closed fingers on two hands.

To overcome this difficulty, Napier invented what came to be known as Napier's Rods, but were facetiously called by the students of those days as "Napier's Bones." These were not slide rules, but were an ingeniously constructed set of multiplication tables whereby a student could perform multiplications without taxing his mind beyond the operation of addition. Barton devotes several chapters to the manipulation of Napier's Rods, and as far as is known at present, his was the first arithmetic to introduce their use.

The arithmetic of Boetius was a Latin revision of a Greek arithmetic by Nicomachus, and was in turn revised by several authors. It was a standard text in the Church Schools throughout the Middle Ages. In one form or another of its many revisions it was used for about a thousand years.

Cocker's arithmetic did a great deal to popularize the use of decimal fractions in arithmetic.

Euclid by John Dee was the first translation into the English language of Euclid. Up to that time, every

(Turn to page 36)

*Illustrations of limited multiplication tables are found even today in some parts of Russia, where the so-called Russian Peasant Method of Multiplication is used. In order to multiply together two numbers of any size, the only operations which the Russian peasant needs to know are multiplication by 2, division by 2, and the operation of addition.

Patent Contracts

■ ■ ■

by Axel A. Hofgren, E. E. '18
Patent Lawyer

MOST engineers, at one time or another, become involved with patents. Frequently, of course, it is as an inventor, so that the procedure for securing and enforcing patents is of interest. However, an increasing number of engineers become involved not only with patents but also with contracts relating to patents. A list of the more generally encountered types of contracts would include:

(a) Assignments
(b) License Agreements
(c) Employer - Employee Agreements

This article will discuss some of the features of each.

Assignments

Patents may be assigned in whole or in part and for the entire territorial right or a limited territorial right. When the entire right to a patent is sold for a cash or other immediate consideration, you retain no control over the invention or patent whatsoever, and even when the assignment is for a partly deferred consideration or royalty you still have few or no strings on the patent; so you should see that the agreement to pay is binding and the royalty collectible. If you assign less than the entire interest in a patent, you may be doing something you never dreamed of doing. A part owner of a patent, whether it be a half interest, a quarter or a hundredth part of the entire interest in a patent, has most of the privileges of the owner of the entire interest so far as making and selling the invention is concerned, and even with respect to granting licenses (non-exclusive). The owner of a part interest cannot sue infringers but, remember, this applies also to the inventor who has sold and assigned a part interest. All of the part-owners of the title to a patent must join in bringing a suit to stop infringement.

Contrary to the belief of many inventors, the purchaser of a half interest in a patent is not required to "split" with the inventor any money he makes (or vice versa), unless there is a definite agreement to that effect, and if there is an agreement it is well to have it in writing. Many inventors agree to assign a half interest in a patent to a person who advances the money for the patent expenses, thinking a 50-50 partnership is formed automatically. But this is not so, for in the absence of an agreement to split any proceeds from the invention, each part-owner can make and sell the patented device independently of the other. Another situation in connection with patents which is sometimes misunderstood is that of "joint inventors." Some have the impression that by joining another as a joint inventor a partnership is formed which will share 50-50 in the proceeds from the invention. Some inventors go so far as to join as a "joint inventor" a person whose only contribution to the development was the money to finance it. This, of course, is a gross mistake and results in an invalid patent. Real "joint inventors" are treated as part-owners, and they need not account to each other for any profits made from their use of the invention.

License Agreements

A license agreement is a form of contract generally used when the title to a patent is to remain in one party (the Licensor) and the right to make and sell the invention is granted to a second party (the Licensee).

A license generally gives the right to make and sell the device of a patent in return for the payment of license fees or royalties. Such contracts may be exclusive (with perhaps a guaranteed minimum royalty or a suitable provision regarding cancellation) or they may be non-exclusive. If the license is exclusive, the patent owner (Licensor) should be protected by a guarantee of at least a certain minimum amount of royalties annually or a suitable provision permitting the Licensor to cancel the agreement, or both, to prevent the Licensee from "shelving" the invention by neglecting to manufacture and sell the invention. Because the cost of putting an invention in final shape for commercial use is frequently quite large, many exclusive licenses do not contain a minimum guarantee and instead contain provisions intended to insure a bona fide effort on the part of the Licensee to market the invention.

A license may be granted after an application for patent is filed and before any patent issues, and by properly identifying the invention a license may be granted even before an application for patent is filed. Unless a shorter period is specified a license extends throughout the remainder of the term of the patent.

by Monfort

Employer-Employee Agreements

The relationship between employers and employees with regard to inventions, whether patented or not, is now most frequently set forth in a written contract. This is particularly true with engineer employees who are in positions having to do with new developments. Such written contracts generally remain in force as long as the employment continues and provide that the employee shall assign to the employer all inventions (and patents secured thereon at the expense of the employer) relating to the products marketed by the employer and new methods and machines used in the manufacture of such products developed as a result of the employment. Some forms of employee contracts require the employee to assign "improvements" on certain inventions or products even after the termination of the employment. Such agreement may prove quite troublesome to enforce. Contracts to assign "all" inventions made in the "future" even after the employment and compensation is terminated have been held void as against public policy, the reason being that they prevent the employee from obtaining another position in any line of work and, thereby, from earning a living.

In the absence of a written contract, however, the status of an employee is not so clearly defined. Various situations may arise. For example, when an engineer is employed for the express purpose of developing a new product or improving an old one, any

(Turn to page 10)

Do You Like the Weather?

■ ■ ■

by H. J. Prebensen, E. E. '26
Vice-President, Air Comfort Corporation

THAT sage of the 19th century, Mark Twain, once said, "Everybody is always talking about the weather, but nobody ever does anything about it." He didn't qualify the word weather, and now the old adage is challenged at the door of every cinema. Yes, you've guessed it: it's 70° cool inside! Our theaters have been the pioneers in comfort cooling.

Fundamentally, air conditioning is a comfort sensation which, in its technical makeup, includes heating, humidifying, ventilating, and cleaning in winter; and cooling, de-humidifying, ventilating, and cleaning in summer. The complete year-round air conditioning system performs all of these functions, each one of which requires definite mechanical equipment, perhaps complicated to the uninitiated, but actually an assembly of rather old devices to perform a new service.

Ventilation of occupied space is an essential function of an air conditioning system,—it means the replenishment of outside air to the conditioned space, and the removal by leakage or mechanical means, and dilution of foul air, smoke, odors, and the like.

Cleanliness of the air we breathe in our offices, our homes, and our places of amusement is of definite importance to our physical well being. By means of fibrous filters which "strain" floating particles from the air, or by washing with sprays of water, air is cleansed, making it more fit for our respiratory organs. The removal of soot, dust, insects, and pollen from the air entering occupied space is especially important from the health angle.

Undeniably, heating has an important place in the complete air conditioning system, for without it, autumn, winter, and spring would be most uncomfortable. To supply this function of heating in between seasons and in the winter, and in all parts of the space, under complete control of temperature, is the full realization of proper application.

The normal spaces of occupancy are grossly deficient in atmospheric moisture in the winter; that sensation of a dry skin which is so apparent is the result of a rather rapid evaporation of moisture from the body into the surrounding air. Like a sponge, air absorbs water to a point of saturation, a different amount for each temperature. When air contains less than this maximum amount of moisture, it is only partially saturated, and its condition is said to be of a certain percentage of "relative humidity."

In summer, the atmosphere, because of a higher outside temperature and rains, is plentifully supplied with moisture. Then, bodily comfort is reduced, because perspiration does not readily evaporate.

It is obvious then, that in both winter and summer, we must control humidity,—add moisture in the winter, and subtract moisture in the summer. The manufactured weather system, therefore, assumes two additional obligations: to humidify in the winter, and dehumidify in the summer.

Comfort cooling for the summer months is a close companion to dehumidifying. They go hand in hand, both almost inseparable, because the modern air conditioning system exposes air to cold water sprays, or cold coils which lower its temperature, and condenses out some of its moisture, just as the cold windowpane in winter "runs" with water and sometimes frosts.

The residence, the office, the restaurant, and the store each have a different air conditioning problem, which must be soundly engineered for satisfactory results.

The residential job is peculiar unto itself. The housewife is a critical person in her home, sensitive to air motion, to cold drafts in the winter, to dried-out furniture, musty fabrics, cleanliness, and the like. Manufactured weather in the home chases that sluggish feeling prevalent in the summer heat: lassitude disappears, and our hours of leisure at home become more pleasant. Two types of year-round air conditioning for the homes are available: a completely mechanical and a split system. The former transfers heat from fuel to air in the winter through one transfer and in the summer depresses the temperature and humidity by means of air contact with cold surfaces in the conditioning unit. Winter humidifying is accomplished along with the air heating. Filtered air, warmed and humidified, or cooled and de-humidified, is delivered under fan pressure through ducts to each room of the house, in the proper quantity and under absolutely automatic control. Filters in the unit cleanse this air of lint, dust, dirt, pollen, and other material in suspension, effecting an appreciable saving in decorations, draperies, and the like which are natural accumulators of dirt.

The latter, or "split system," employs the usual steam, hot water, or vapor boiler in conjunction with a conditioning unit, transferring heat through a coil surface from steam, water, or vapor to the air, mechanically distributed under fan pressure through ducts to each room. Bathrooms, kitchens, or other spaces from which return air is not normally taken are heated by the usual radiators. In the existing home, provided with a boiler in satisfactory condition, the split system is generally the least expensive and is highly satisfactory.

The conditioning system for the home must be quiet. All of us can stand the usual noise level of the ordinary office, but the home, calm, tranquil, where even the smallest noises disturb our hours with a favorite author, a needed nap, or a restful slumber, noise from a conditioning system cannot and need not be tolerated. Suitable sound-absorbing materials, selected by engineering judgment, muffle all equipment and air noise.

Air conditioning systems for places of business meet a problem kindred to that of the home but with other factors not to be overlooked. Shifting of

(Turn to page 38)

Fluctuations in Building Activity

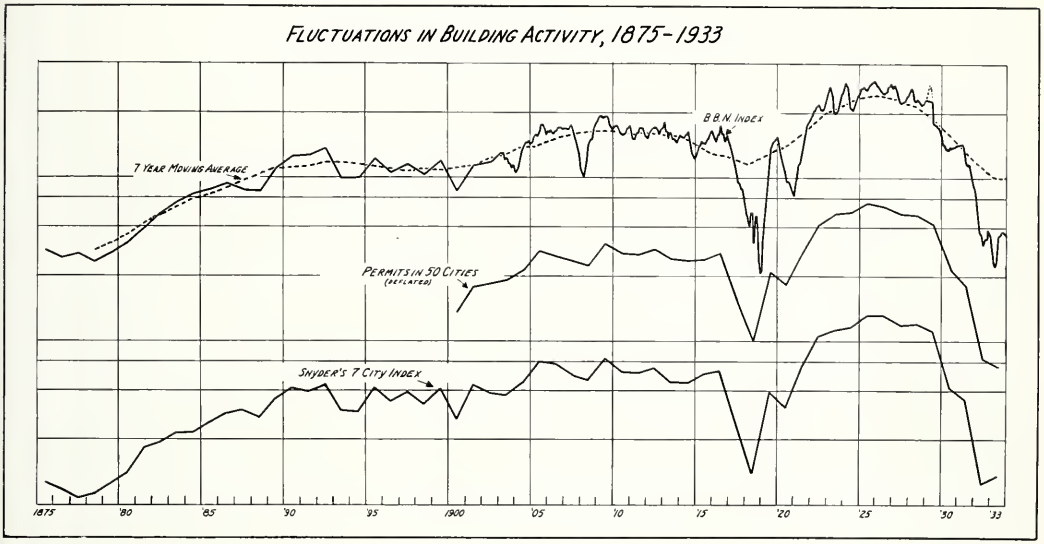
■ ■ ■

by W. H. Newman, Ph. D.
of McKinsey, Wellington & Co.

The engineer cannot live apart from the economic world which uses his service and the products of his labors. For this reason, the engineer should familiarize himself with the behavior of the economic system that directs the use of his knowledge and abilities.

The building industry, one section of the economic world, warrants attention because of the unusual fluctuations in the volume of its activity. These fluctuations affect not only the architect and the building contractor, but also a wide range of industries supplying building materials, building fixtures, and equipment installed in new buildings. The engineer working in the building or related industries can better serve his employer if he recognizes the nature and extent of building fluctuations. In addition, these fluctuations may have a direct bearing upon the employment of the engineer himself.

The severe curtailment of building activity during the recent depression years is well known to all those concerned with the industry. It is of interest to note whether this is an unprecedented experience or if such drastic reductions in activity have occurred in the past with any degree of frequency. To study this question, an index based on building permits from representative cities throughout the United States was constructed for the period from 1875 through 1933. This index, and two similar indices, are shown in the accompanying semi-logarithmic chart. The effect of price fluctuations has been eliminated so that the vertical fluctuations represent changes in the physical volume of building activity. Being based on building permits, the indices represent primarily building undertaken by private enterprises, as contrasted with public building undertaken by municipal, state, federal, or other governmental bodies.



This index shows that drastic declines in building activity, such as recently experienced, are not unprecedented. Careful examination of the index reveals that building activity during the last half century has occurred in great waves or "major cycles" lasting from fifteen to twenty-one years. The first major cycle commenced in the depression of the '70's, rose rapidly to a peak in the early '90's, and then gradually declined to a low point just prior to 1900. The second major cycle, twenty-one years in length like its predecessor, was completed during the time of the World War when building activity was at an unusually low level. The most recent cycle, which we hope was completed in 1933, reached its peak during the '20's. These major cycles are the basic, underlying movement affecting the entire industry.

The percentage variation of these waves of activity has been very large. For example, the volume at the 1925 peak was approximately fifteen times as large as the volume at the low points in 1918 and 1933. Such violent fluctuations in building activity will have a major effect upon the volume of business secured by building contractors and suppliers of building material and equipment.

Major cycles in building activity by no means account for all the fluctua-

tions in building volume. In addition, a careful examination of the index reveals "minor cycles" or fluctuations above and below the underlying trend, which last from four to five years and correspond more nearly to the popular conception of business cycles. The B-B-N index shows eleven such minor cycles during the period from 1875 to 1933. They occur during both the gradual expansion and the gradual contraction of the major cycles mentioned above.

The magnitude of these minor cycles is so wide that they materially affect the business of those connected with the building industry. Anyone associated with building activity should be prepared to expand or contract his activities with these minor cycles. By following sound policies, however, it is possible to adjust to the minor cycles much more readily than to the major cycles which are more continuous in their influence.

The accompanying chart does not show fluctuations in the volume of *public* building activity. In the past, public building was generally much less important than private building. Recently, there has been much discussion of the possibility of constructing public works during depressions so as to offset the violent fluctuations in private building activity. For various reasons such efforts have been only partially successful. Although the Federal Government has recently spent huge sums for building, the expenditures by municipalities and other minor civil bodies have been reduced to an even greater extent. As a consequence, at present the total volume of public building is somewhat lower than the peak reached during the 1920's, and fails to offset the decline in private building activity.

It is only natural to ask why such violent fluctuations in building activity should occur. Some understanding of the nature of the problem is found in the durability of buildings. Unlike food or clothes which are consumed within a short span of a few months or a year and must be replaced, a building can render service for many years with only minor expenditures for maintenance and repairs. Once a supply of buildings is created, very few additional buildings are required, or at least replacement can be postponed for long periods of time. As a consequence, the building industry can experience intense activity during a time when homes, offices, or hotels are being constructed and then undergo a drastic reduction in activity while these buildings serve the needs of the community. In contrast, the production of perishable or semi-durable goods can be postponed for only short periods of time if the community continues to use the product. Because of this, activity in industries producing non-durable goods tends to be more stable than activity in industries producing durable products such as buildings.

Public sentiment also plays a part in the variations of building activity. The adequacy of existing building space is difficult, if not impossible to determine accurately. Unwary investors are likely to assume that, because certain favorably located buildings are earning high rentals, the demand will continue indefinitely in the future. The spirit of prosperity prevails, and construction activity is carried far beyond the actual needs. After the mistakes are discovered, the excess supply of buildings hangs over the market, discouraging new construction activity until old structures gradually wear out or new demands arise.

Although the durable characteristic of buildings and the influence of over- or under-optimism may assist in understanding why the building industry experiences such violent ups and downs, we still need some guide or aid in forecasting future building activity. Any indication of future volume of building activity will assist the engineer in adapting his activities to the probable future demand for his services. If, for example, a building equipment manufacturer had reasonable assurance of an improvement in the demand for his product he would attempt to adjust his operations to this increased demand. On the other hand, if the future trend appeared to be downward the building equipment manufacturer would follow a different set of policies in retrenching his operations to the anticipated decline in demand for his products.

It is always difficult to make an accurate forecast of building activity, and a prediction made at the present time is likely to require major adjustment after a few months because of changes in the general business situation. The most that can be attempted here is to indicate the more important factors which will probably affect the volume of building activity in the future.*

In general, it may be said that major building cycles appear to be intimately associated with shifts in population. Some alteration in social or economic conditions causes an increase of population in certain communities. These new people demand housing, and the economic activities which they create must be sheltered. Then as the rate of population growth falls the volume of building activity also declines. Statistics show that the investigator who can predict population changes has the key to forecasting major cycles in building activity.

For minor building cycles the availability of funds to finance building appears to be among the primary factors. The willingness of individuals or financial institutions to advance loans for new construction has a direct bearing on the expansion or contraction of building activity. The actual interest rate charged may not vary, but interest rates on seasoned securities are likely to indicate conditions in the money markets. In addition to the availability of funds, minor building cycles are also influenced by general business conditions.

Even if the engineer does not feel competent to forecast building fluctuations he should recognize their existence and their nature.

*For a more complete discussion of the factors underlying building fluctuations see the writer's "The Building Industry and Business Cycles." (Chicago: The University of Chicago Press, 1935.)

Patent Contracts

(From page 7)

such product invented by the employee is the property of the employer. The employer is entitled to any patent issuing on the invention and therefore should bear the patent expense.

If an employee is not hired for development work, but as a result of his employment is placed in a position to invent an improvement in the employer's product, or a method or machine for manufacturing the product, and the invention is completed at the employer's expense, the employer is said to have a "shop right" in the invention. Such a right permits the employer to use the invention in his own business without paying a license fee or royalty. But the "shop right" is not exclusive, and the employee may license others. A "shop right" is in the nature of an *implied* license, and the actual facts in every case must be considered to determine whether such an *implied* right exists and whether the employee or employer is entitled to any patent issuing on the invention.

The point to bear in mind is that under certain circumstances adverse rights in a patent may arise by the actions of the parties without intention and even contrary to intention. Whether as inventor, employee, employer, part-owner, or Licensee, or in whatever capacity an interest in a patent may arise, a full and clear understanding of the rights and liabilities of each party involved is essential.

New Engineering Shop Courses

■■■

by Wm. A. Pearl, Ph. D.
Associate Professor of Mechanical Engineering

by Monfort

WITH progress in the fields of engineering comes new technical information, new processes, and new methods. Armour Institute is keeping step with and training men for modern industry. The reorganization of the engineering shop courses is one of the important aspects of the new development program now under way. This necessitated a redistribution of the time to be spent on the various courses, the addition of modern processes and equipment, and the elimination of the obsolete and less important parts. It is with the aid of valuable information obtained by conferences, and questionnaires* sent to industrial executives, practicing engineers, members of engineering faculties, and alumni that this reorganization has been accomplished. Recognizing that ultimately a large proportion of the engineering college graduates become associated with some form of production or manufacturing, both the student and industry were considered. The shop work is designed to give the student a training in the fundamentals of engineering shops from which he will derive the most benefit in his future work.

It is not so long ago that the engineer depended on the blacksmith to shape the steel for use. The pattern-maker made the many patterns for shaping of molten metal in molds. The assembly of machinery was accompanied by much scraping, filing, and fitting. Accurate tools, gages, and automatic machine tools had not entered the picture. But today, gas and electric welding, die casting, permanent molds and dies, centrifugal and slush castings, drop-forgings, heat treating ovens, and accurate production machine tools require the engineer to be familiar with many new methods and processes.

The shop processes divide themselves naturally into certain groups. In producing the many accomplishments that are the result of engineering, different materials and methods are involved. It is in the engineering shops that these materials are recovered from their natural state, shaped in the molten state, hot or cold worked, machined, and heat treated. Into these natural divisions the shop work has been divided. It is evident that in all of these processes the physical properties of the materials are involved and should be understood. Also, shop economics and organization are an essential part of the shop training.

While it has been common practice to require the college student to spend many hours in simple mechanical procedure such as chipping, filing, and the like, with our modern educational program this is well covered in the shop work in our secondary schools. The development of skill in operation of the machines is also considered of secondary importance in the college shop work. However, a certain degree of manual dexterity and skill will be developed by teaching the student processes. To accomplish the desired objectives the shop work is accompanied by lectures, demonstrations, and inspection trips.

The machine shop was opened last fall, and each term another shop is being prepared. A shop for hot and cold working of metals, welding, and heat treating has been arranged in Machinery Hall with new equipment. The next shop to be reopened will be the foundry. The fundamentals of all the molten metal processes will be included in this part of the work. Sufficient time will be devoted to pattern making to teach the principles involved.

It was not the intent in the reorganization to deprive the student of the opportunity to use his hands, but rather to be sure that he understands the fundamentals involved in each and every process. This, together with the incorporation of new processes and equipment, should add to the benefit to be derived by the students and qualify the Armour Engineering Shops as modern.

*Report of Committee on Shop Policy, Armour Institute of Technology, March, 1935.

MEET THE TRUSTEES

● Stuyvesant Peabody

STUYVESANT PEABODY had an early introduction to responsibility, becoming president of Peabody Coal Company and its nineteen subsidiaries at the age of twenty-six. A native Chicagoan, he finds plenty in the worlds of sport and business to interest him at home, and is reluctant to leave the city except on visits to his mining properties. Aside from photography, at which he is an adept amateur, his chief hobby is farming; his week-ends are spent directing operations at his Arrowbrook Farm near Lemont. His family have always been enthusiastic horse-lovers, and it is entirely in character for him to appear as president of Chicago's Lincoln Fields Jockey Club and vice-president of American Turf Association. Week-days he finds amusement and exercise in a game of squash at the Racquet Club or the Chicago Club. He never misses an important athletic exhibition. The Commercial Club of Chicago and Delta Sigma Pi, national business fraternity, claim him as member. His college fraternity is Delta Kappa Epsilon. Mr. Peabody has chosen to give but slight attention to society and social prominence, although his name is steeped in traditions of Chicago, and takes pride in being known by friends and associates as a hard-working executive who spends every day in his office—and most of every day on the telephone, which, he says, makes it easy for him to cover more ground in less time.

* * *

● Harris Perlstein

HARRIS PERLSTEIN, born in New York City, received his education in Chicago. After graduating from high school, he spent a year getting some chemical experience before entering Armour. Following his graduation in Chemical Engineering in 1914, Mr. Perlstein gained practical experience at various plants for a few years and then became a partner in the consulting firm of Singer-Perlstein Co., which firm specialized in grain products and developed an international clientele.

The first connection of Mr. Perlstein with the firm which he now heads was through engineering services rendered by Singer-Perlstein Co. He has for some years been President of Premier-Pabst Corporation, which, in addition to operating two large breweries, operates a malt house and manufactures other malt products. He is a member of the Board of Directors of Allied Mills, Inc., and a member of Lake Shore Country Club and Standard Club.

* * *

Howard M. Raymond ●

President Emeritus of Armour Institute of Technology since 1933, HOWARD MONROE RAYMOND is an old friend of faculty members and alumni.

He was born at Grass Lake, Michigan, in 1872. At the University of Michigan, in 1893, he received the degree of bachelor of science in electrical engineering and, after a year's employment with the Rockford Electrical Manufacturing Company, he returned to the University of Michigan for graduate work in physics and electrical engineering.

In 1895 he became an instructor of physics at Armour Scientific Academy; from 1899 to 1903 he was its principal. For the next twenty years he was dean of engineering studies at the Institute, and he became acting-president in 1921 upon the death of Dr. F. W. Gunsaulus, and president in 1922, from which position he retired in 1932. In 1922 he received an honorary degree of Doctor of Science from the Colorado School of Mines.

Dr. Raymond is editor-in-chief of *Modern Shop Practice,* a Fellow of the American Association for the Advancement of Science, and a member of the Society for the Promotion of Engineering Education. He is also a member of Phi Delta Theta and Tau Beta Pi fraternities.

Dr. Raymond is now enjoying life in retirement, with Mrs. Raymond, in the place of his birth, making occasional trips back to Chicago to renew old friendships and to look over the scenes of his busy years.

* * *

GEORGE W. ROSSETTER, head of the firm which bears his name, George Rossetter & Co., Certified Public Accountants, with offices at 33 North La Salle Street, was born in 1879, at Gilman, Illinois. Mr. Rossetter is a product of Chicago's educational system, having attended the Chicago public schools, the Y.M.C.A., and Northwestern University School of Commerce. He was married to Marjorie Aylesworth Mihills in 1913;

● George W. Rossetter

and they have three sons. Mr. Rossetter was a machine gun officer in the World War, serving nine months overseas. He is an ardent sportsman, and his favorite pastimes are golfing, horseback riding, and fishing.

Mr. Rossetter's free moments are well occupied, as evidenced partly by membership in several professional and social organizations, which are too numerous to list fully. However, he is a member of the Chicago Association of Commerce, Chicago Crime Commission, Izaak Walton League, American Legion, Beta Alpha Psi Fraternity, Union League Club of Chicago, Knollwood Country Club, and the Rotary Club of Chicago.

* * *

JOHN J. SCHOMMER, Professor of Industrial Chemistry and Director of Physical Education, is a man of many activities. He is an analyst and consultant engineer, and a referee at many of the large conference athletic events. In recent years, Mr. Schommer has given considerable time to talks and lectures on sports, and is in demand as a radio speaker. He is a member of the University Club, Knights of Columbus, American Chemical Society, Chemists Club of Chicago, American Society of Testing Materials, and others.

After attending the Chicago public schools, Mr. Schommer entered the University of Chicago in 1905. His unusual athletic ability resulted in twelve major letters, in football, basketball, baseball, and track. He was captain of the National Intercollegiate Basketball Champions, an All-Western end in football, and an All-Western center in basketball. Besides, he was a University Marshal, a member of "Owl and Serpent," and of Phi Kappa Sigma. In addition, he graduated with thirteen major credits more than were required.

After two years of graduate work in bacteriology at the University of Chicago, Mr. Schommer entered Armour for a year of study, and graduated in 1912 with the degree of Bachelor of Science in Chemical Engineering. It was in this year, also, that he married Miss Elsie Steffen. He was a director of the Acme Plating Company for ten years before becoming its owner from 1918 to 1919. During this period he coached at one time or another every major sport at both Armour Tech and the University of Chicago.

* * *

BERNARD E. SUNNY was born in Brooklyn, New York. In 1875, at the age of eighteen, he came to Chicago and started to work as an experienced telegrapher. In a short time, he became night manager of the Chicago office of the Atlantic and Pacific Telegraph Company. In 1878, he entered the telephone industry, and the following year became superintendent of the Bell Telephone of Illinois, a small company which operated Chicago's first city-wide telephone service. In 1888, when Mr. Sunny left the Bell Telephone to become president of the Chicago Arc Light and Power Company, there were more than ten times as many telephones in use as when he started. Twenty years later, Mr. Sunny re-entered the telephone industry, this time as president of the Chicago Telephone Company. In 1911, he became president of the Central Group of Telephone Companies, and since 1922 he has been Chairman of the Board of Directors of the Illinois Bell Telephone Company, a position he still holds. He is also a director of the General Electric Company, the First National Bank of Chicago, the Chicago Great Western Railroad, and many other important concerns. For several years he was vice-president of the American Telephone and Telegraph Company.

Mr. Sunny has been one of Chicago's most prominent citizens in community affairs. He has found time to associate himself with almost every public enterprise since the World's Columbian Exposition of 1893.

In 1908, Armour Institute of Technology conferred upon him the degree of Doctor of Engineering.

(Turn to page 15)

● Russell Wiles

John J. Schommer ●

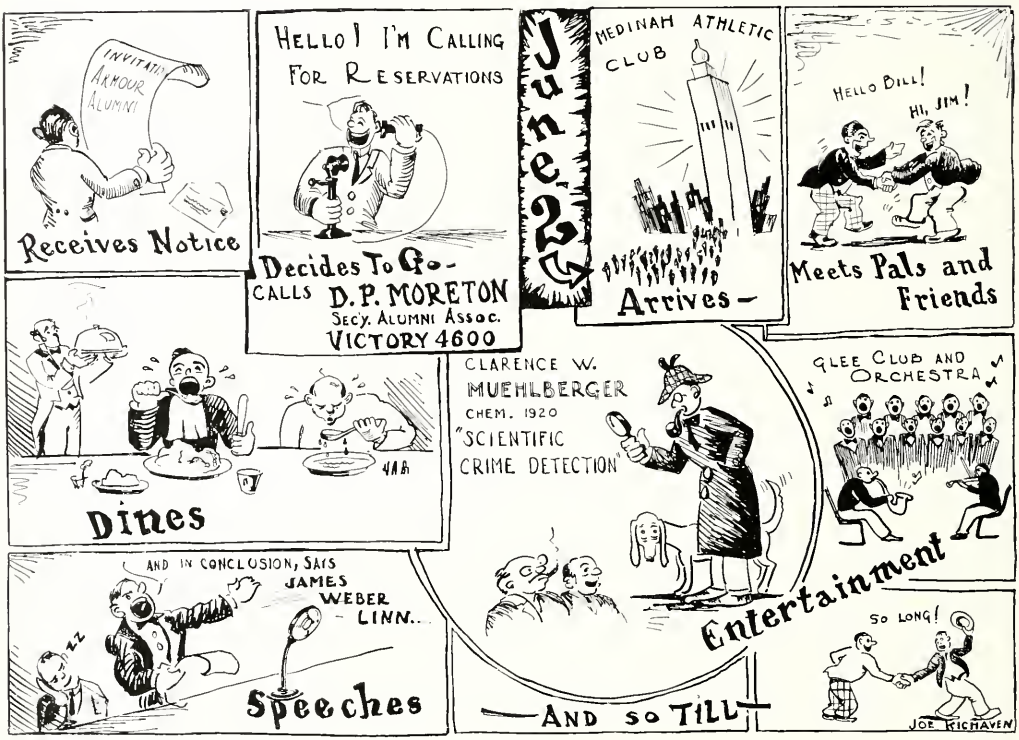
Bernard E. Sunny ●

Armour Alumni Banquet and Election

AT THE MEDINAH ATHLETIC CLUB

505 North Michigan Boulevard

JUNE 2



The annual spring alumni banquet will be held Tuesday evening, June 2, at 6:30 P. M., at the Medinah Athletic Club, 505 North Michigan Avenue. Tickets, $1.75. Make reservations with D. P. Moreton, Secretary, by phone, Victory 4600; or by mail, 3300 Federal Street.

On that big night you will enjoy meeting your classmates, friends of the alumni, faculty, and trustees.

You will be entertained by O. Gordon Erickson and his glee and orchestra club a hundred strong.

You will see the winner of the Alumni Award of Merit presented to the senior honor student of the class of 1936.

You will see the Alumni Award of Merit presented to an Armour graduate for distinguished service in his profession.

You will see the Alumni Key presented to an alumnus for distinguished service rendered to the Alumni Association.

You will hear Clarence W. Muhlberger of the Coroner's Laboratory. He is a former graduate of the Department of Chemical Engineering. His talk, with lantern slides, will be on "The Investigations of Bombs and Explosions." Bring your guns!

You will hear James Weber Linn in one of his humorous and entertaining after dinner "roundups."

James Cunningham, President of the Board of Trustees, will give a talk.

President Willard E. Hotchkiss will answer questions pertaining to the Institute.

There will be an election of alumni officers.

A real effort is being made to have a fine turnout for each class, so get in touch with your old school friends and help make this event a big success.

Research Foundation Established

■ ■ ■

Most significant of recent developments at the Institute is the establishment of a Research Foundation, the object of which, as stated in the certificate of incorporation, is

"to promote, encourage, maintain, and aid scientific investigation and research in affiliation with Armour Institute of Technology by the faculty, staff, alumni, and students thereof, and others associated therewith, and to provide or assist in providing the equipment, machinery, and means by which their scientific studies, discoveries, inventions, and processes may be developed, applied, and protected, and the public and commercial uses thereof determined and safeguarded, and by which such utilization or disposition may be made of such discoveries, inventions, and processes as may tend to stimulate and promote and provide ways and means for further scientific investigation and research."

On April 10, the Board of Directors of the newly organized Foundation elected, as pioneer officers of the Foundation, W. E. Hotchkiss, President; C. W. Hills, Jr., Vice-President; R. B. Harper, Treasurer; and H. H. Cooper, Secretary. The other members of the Board are J. D. Cunningham, P. H. Davis, and A. L. Eustice, all Trustees of Armour Institute of Technology. H. H. Cooper and C. P. Parker will act as counsel. These officers are charged with the duty of organizing the work of the Foundation and carrying it through its initial period of promotion and development.

The members of the Foundation will be of two classes, active and sustaining: the first, not to exceed fifty at any one time, consisting of members of the Board of Trustees, of the Faculty, and of alumni; and the second, of such persons as are elected by the Board of Directors, the number and qualifications being determined by the Board.

From present indications, it is believed that there is a large, untapped opportunity to cooperate with industrial concerns in undertaking promising research projects. Such projects will be manned with competent research personnel, and will be set up in such a way as to give promise of rendering valuable research service to the participating concerns, and, at the same time, yielding substantial benefits to Armour Institute of Technology. The benefits which will accrue to the Institute will be in part financial, in part scientific, and in part educational. While the Research Foundation is organized as a corporation not for profit, its contracts with Armour Institute of Technology will, of course, carry a charge, not only for the direct service in handling the project, but a suitable loading for the use of facilities which the Institute will provide. This loading factor over and above the direct expenditures will, of course, help in meeting the general financial requirements of the Institute.

The indirect benefits which will come from enabling the Institute to develop as a center of engineering and scientific research are likely to be of much greater importance in the long run than the direct benefits. Success in the work which the Foundation is about to undertake should entail substantial contributions to scientific and engineering knowledge, and carry with it the inspiration and prestige which naturally follow from such contributions. Achievements of this sort will naturally permeate the educational work, both graduate and undergraduate, and should result in its constant enrichment.

Numerous research projects are being explored and promoted; some of them are already under way, and several others are nearly ready to proceed. One such project, it is expected, will be underwritten in a substantial amount by a company with which one of the members of the Board of Trustees is connected. While the underwriting will be for a period of one year, the intention has been expressed of making it continuous.

Another project, which is not quite so far advanced at the moment, has to do with the development of Metallurgy, both from the standpoint of teaching and research. Explorations are now under way for developing promising bases of cooperative research in respect to railroads, public utilities, electrical industries, chemical industries, automobiles, as well as with a number of individual concerns. In the cases in which extensive research projects are undertaken, it is expected that the project will be under the supervision of a director who is specifically chosen for his qualification to carry on the project in question, and that the space and equipment required to do the work effectively will be provided to meet the specific needs of the undertaking.

As soon as an adequate number of new projects are under way, it is contemplated that permanent administrative and scientific research personnel will be recruited.

* * *

Meet the Trustees

(From page 13)

Protecting the inventions and processes of modern engineering has been the life work of RUSSELL WILES. As a patent attorney, Mr. Wiles has been intimately connected with the engineering profession since his admission to the Bar in 1904.

He was born in Freeport, Illinois, in 1881, and was graduated from the Freeport High School in 1897. From the University of Chicago he received the degree of Bachelor of Science in 1901, and three years later the Master of Science and Bachelor of Laws degrees from Northwestern.

In 1906, he joined the firm of Dyrenforth, Lee, Chritton, and Wiles; and, he has been an active partner ever since. During these thirty years he has handled nearly every type of case in his field, but in recent years he has specialized in chemical matters, particularly those relating to petroleum technology.

Mr. Wiles' chief hobby is small arms and rifle shooting. He is a director of the National Rifle Association and a representative of the sport on the American Olympic Committee. On several occasions he has shot on American International teams. He is Past President of the Chicago Patent Law Association and a member of most of his professional societies. He is also a member of Phi Gamma Delta, a Knight Templar and 32nd Degree Mason, Past Master of his lodge, and a former Grand Lecturer.

One Hour For Armour Tech

An Appeal to the Alumni

Competition among colleges and universities in attracting prospective students is becoming more active each year. Fine buildings, an extensive campus, prominence in athletics, liberal scholarships, low tuition costs, opportunities for self support, are among the many attractions presented to the graduates of the high schools and preparatory schools each year. Some colleges maintain staff members who devote a large part of their time to this type of publicity alone and cover wide reaches of territory.

Armour Tech also needs new students each year. A small volunteer staff recruited from our executives and instructors do this work in the Chicago area in addition to their other duties in the school. No salaries are paid for this activity. Results from their work are shown in the practically uniform and near capacity enrollment each year.

We are not satisfied with numbers alone. We want quality and the opportunity to raise constantly our standards by having a larger number of applicants from whom to choose our quota. We would like to enroll a larger number of students from other communities and states.

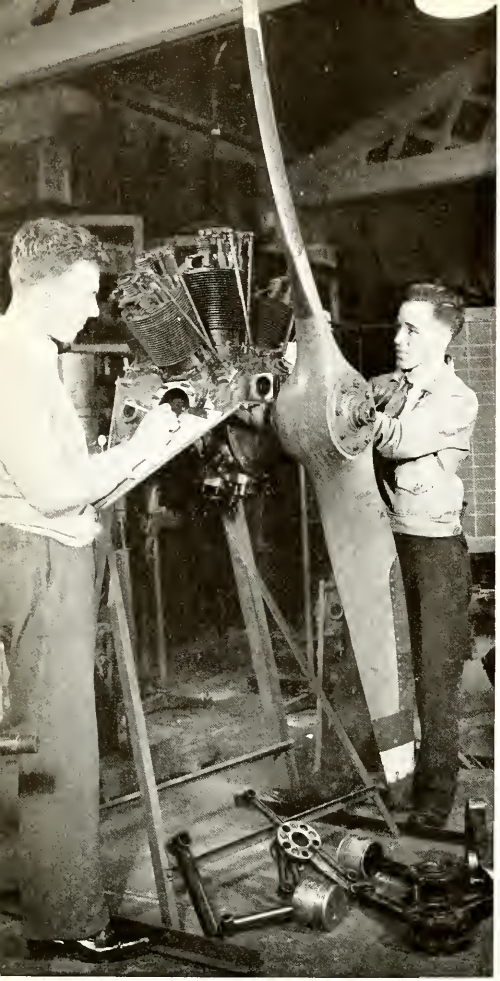
No glittering inducements are offered in competition with other colleges. We do not have the things which make college life attractive to many. But our courses in engineering and architecture are of the highest order. The work is hard, but the foundation for success in the technical or industrial field is secure. The achievements of many of our alumni bear out this fact.

Next month a group of young men are graduating from the high school in your neighborhood. Many of them are planning on going to college and are interested in obtaining definite information about technical schools and the courses offered. Will you give an hour of your time to Armour Tech for this purpose? Just tell them about our courses—what you received and how it has served you in the industrial field.

Ask the principal of the community high school to announce to the young men in the graduating class that you will come there for one hour some day during the month of May at a time agreed upon in advance. Also, that you will hold an informal conference with those who may care to ask questions about the courses offered at Armour, or to obtain general information about the College of Engineering and Architecture, Evening Division, Summer School, or the Cooperative Course in Mechanical Engineering. You will be supplied with a copy of the General Information Bulletin previous to your visit. We will follow up your introductory work with prospective students after their names are sent to us.

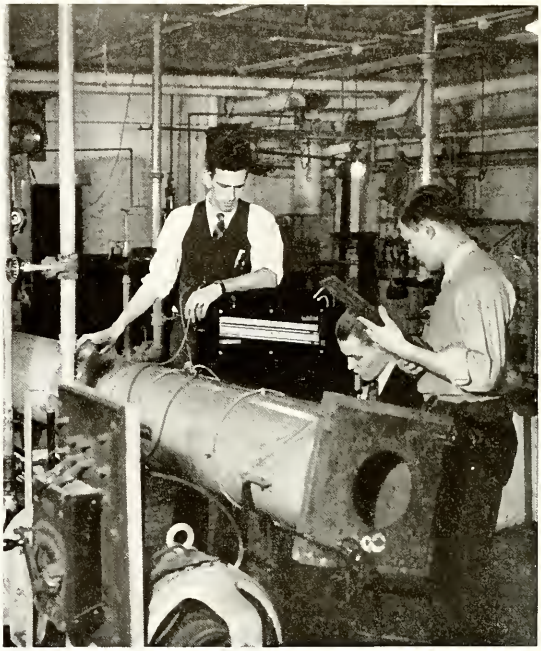
This plan was tried successfully among a few alumni last year. One hour of your time may send a new student to Armour. Please address correspondence to C. E. Paul, Chairman, Publicity Committee, 3300 Federal Street, Chicago.

ARMOUR
INSTITUTE OF TECHNOLOGY
CHICAGO

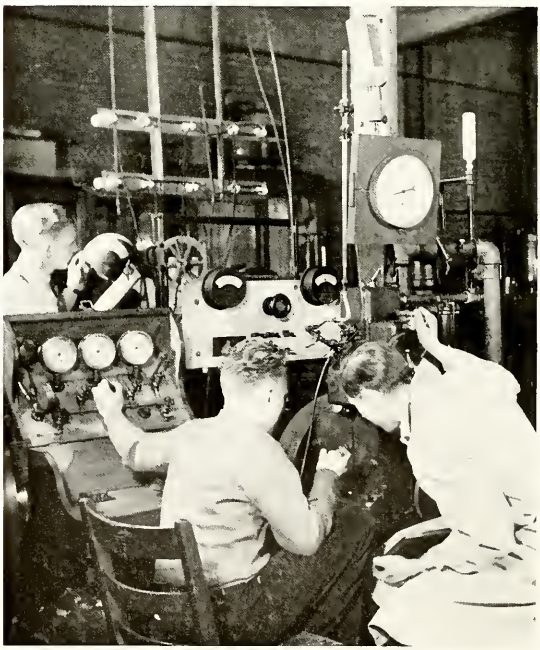


Full instruction in the mechanics of airplanes is part of the program at Armour.

This collection of pictures of students at work and play at Armour Institute of Technology will interest you.



Air-conditioning is another comparatively new industry in which Armour students receive practical instruction.



Testing the performance of a Diesel motor.

PLACE OF ACHIEVEMENT

Armour Institute of Technology has been for 44 years a place of outstanding educational achievement in the Central West. Young men here find thorough and comprehensive courses leading to the degree of Bachelor of Science in Architecture, in Chemical Engineering, Civil Engineering, Electrical Engineering, Engineering Science, Fire Protection Engineering, and Mechanical Engineering.

Armour Tech offers courses to meet the convenience of students.

DAY SCHOOL

EVENING SCHOOL

(Graduate and undergraduate courses)

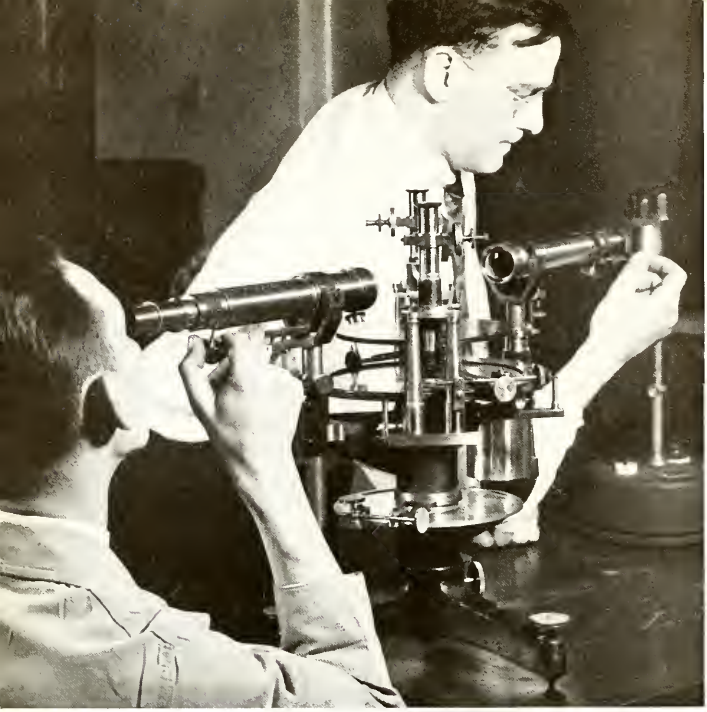
SUMMER SCHOOL

(Offers opportunity to make up work)

Graduates of these courses have open to them a wide variety of service in municipalities and in industry. The Research Foundation, recently established at the Institute, will give opportunity to students for a wide variety of experiments in fields which are less well-known.

The central stairway of the main building.

Fraternities and social organizations add interest to the student life.

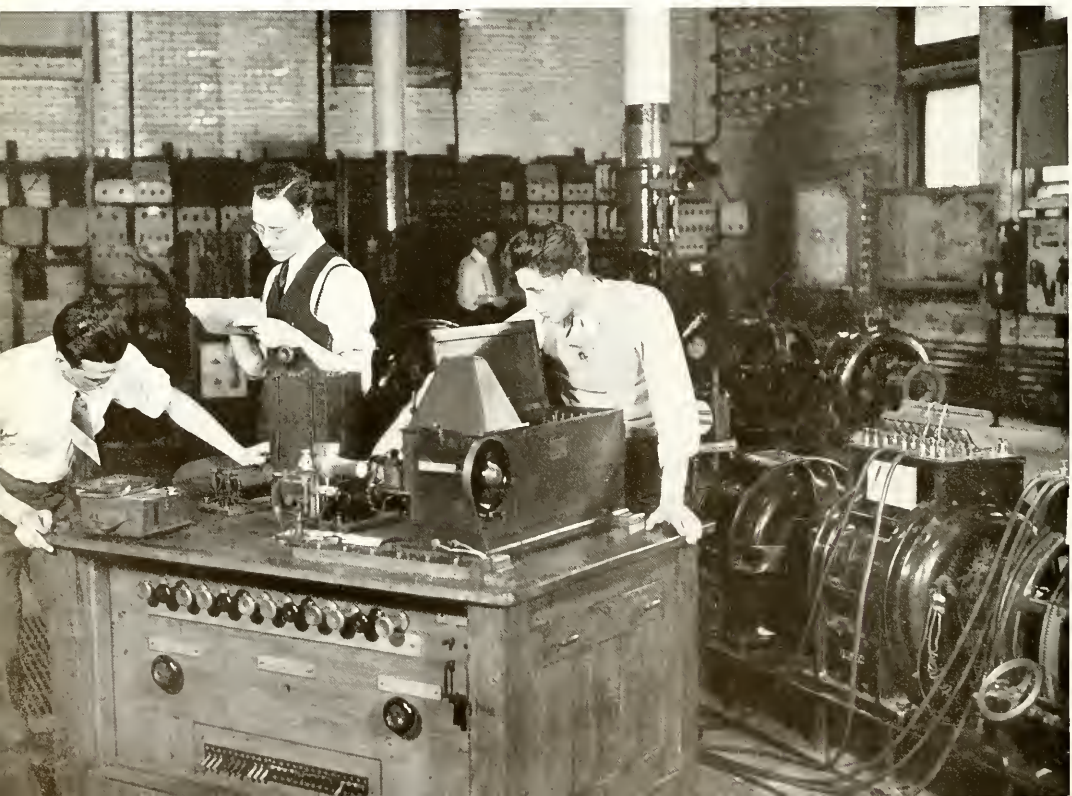


Put yourself into these pictures.

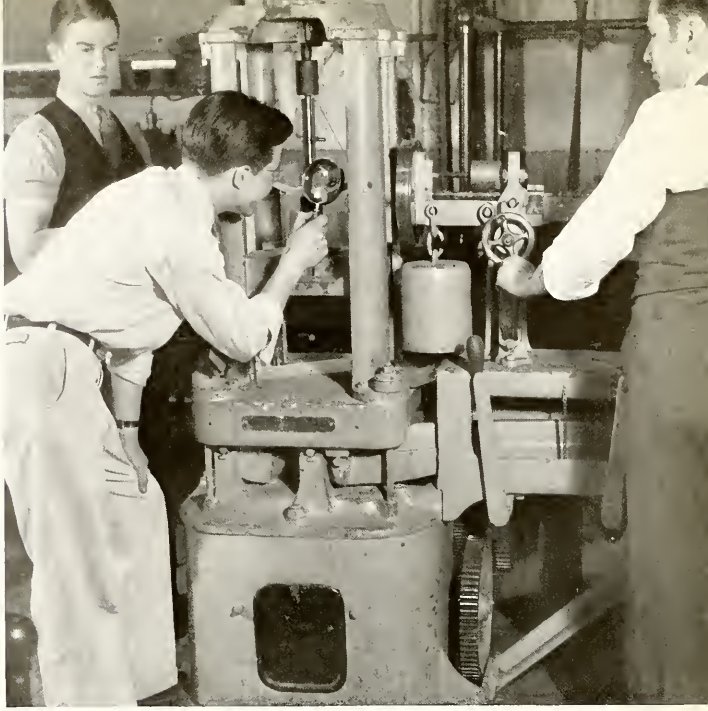
Imagine that you are running a test in the chem. lab. or studying the operation of a powerful tool in the machine shop.

Left — An intricate experiment in the Physics Department.

Bottom—Advanced experiment in the Electrical Department.



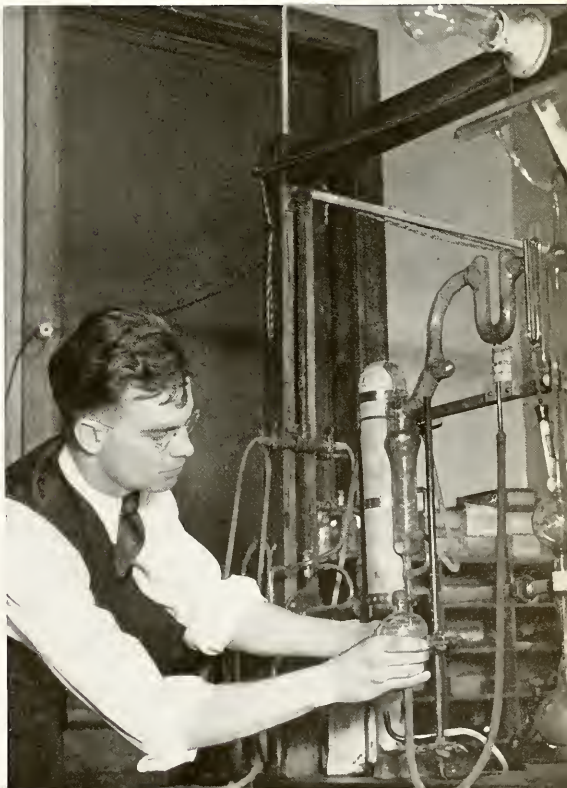
The young men you see here have started on their professional course. There is plenty of work ahead of them, but they are on their way. They made the decision which brought them to Armour Tech with the determination to follow the course to the end. Thousands of other young men hesitated and decided to stay home. Twenty years from now these Armour students will be building bridges, managing paper mills, directing a city sewage system, taking a large part in the affairs of the world.



The ability to test materials is vital to every practical engineer. The camera caught these students testing a steel bar.

Bacteriology is needed by engineers who expect to be concerned about the water supply of a city.

Experiment in the Department of Science.



ital to the health of every large city is the work the sanitary engineer. The large equipment r the treatment of water covers several floors.

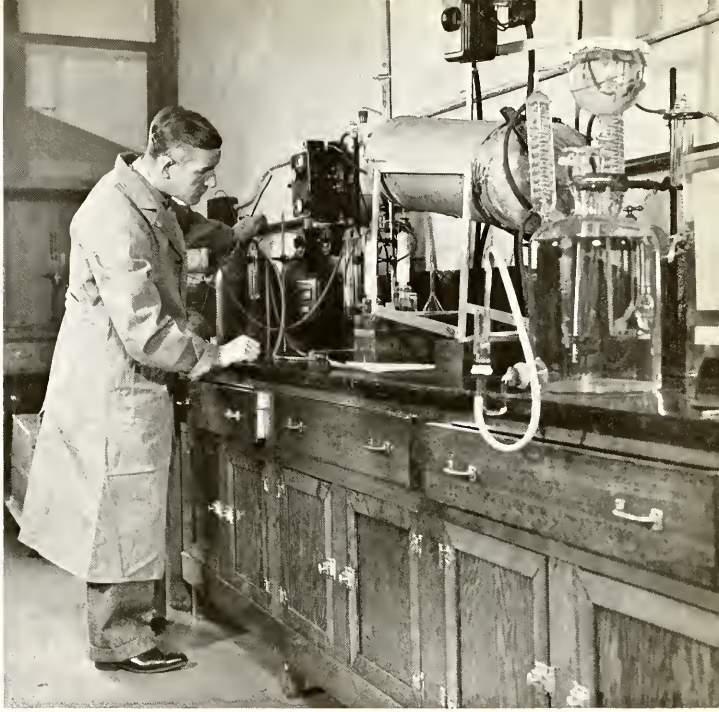
A student modeling.

The Art Institute.

The close relationship of Armour Tech to the life of Chicago is illustrated by the School of Architecture, many of the classes of which meet in the Art Institute, the building on Michigan Avenue in the heart of Chicago. The pure and applied scientific subjects in architecture are given at Armour Tech, while the professional subjects are presented at the Art Institute. Graduates of the Department of Architecture have achieved notable success in that field.

At the summer camp.

Every high school lad is eager to make things. Armour Tech was planned to help him. The courses offered will enable him to achieve his desires for creating. These courses, in radio, electronics, refrigeration, air-conditioning, etc., are constantly kept up to date.



Studying the conservation of hydrocarbon gases to discover new by-products of oil.

Seniors in Fire Protection Engineering conducting a test at the Underwriter's Laboratory.

The Orchestra and Glee Club

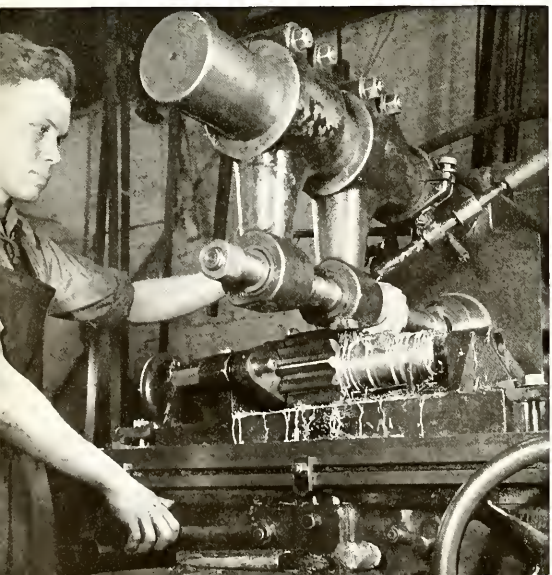
The achievements of Armour alumni have been notable. Many men who occupy positions of responsibility in business and industry look back with appreciation on their student days at Armour Tech. Here are a few of many success stories:

A prominent alumnus was the first successful producer of malt sugar, and was at the same time responsible for the business success of the company utilizing this product.

Another alumnus is the chief executive of one of the largest metal companies in the United States, and has developed a process for the recovery of pure metal from scrap.

An alumni trustee was the inventor of the teletype, and in collaboration with another

A student in the Co-operative Course.



Students operating amateur radio station.

A Class Dance.

trustee developed the company which is successfully producing it.

One graduate did pioneer work in the development of internal combustion engines. He became president and, later, chairman of the board of directors of the largest company making motors for automobiles.

A former student was especially prominent in the development of American motor cars; he designed and built some of the first taxicabs, was interested in the earlier automobile races, and became president of a well-known company making motor cars.

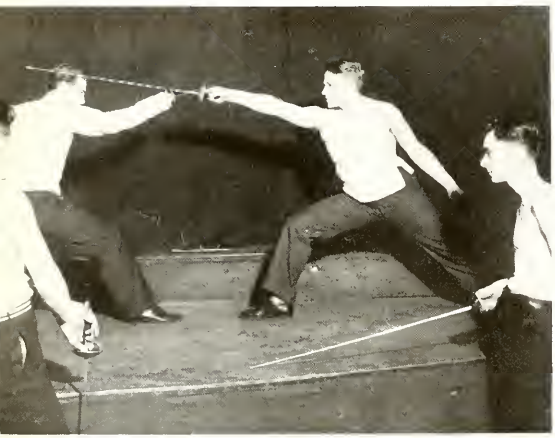
An alumnus, now Lt. Col. of Reserves, serving under Gen. Pershing, had charge of all refrigeration for the American Expeditionary Forces during the War. He has done extensive research on boiler operations and is a successful manufacturer of a well-known boiler compound.

All civil engineering students must spend at least one summer at the camp in Northern Wisconsin—there is plenty of fun connected with the field work.

Methods of making commercial chemicals are being studied by this group. The two boys on the right are making bromo-benzine, from which carbolic acid is manufactured.

These archers are only posing.

But these chess players seem really to be playing a game.



The fencers performing.

Armour men must work, and work hard, but they don't work all the time. A variety of athletics engages their attention, and once in a while they relax in a dramatic production or in pure fun, as on "Hobo Day." The Armour Tech Relay Carnival is one of the outstanding athletic events of the Central West. As many as 400 athletes from 36 colleges and universities compete.

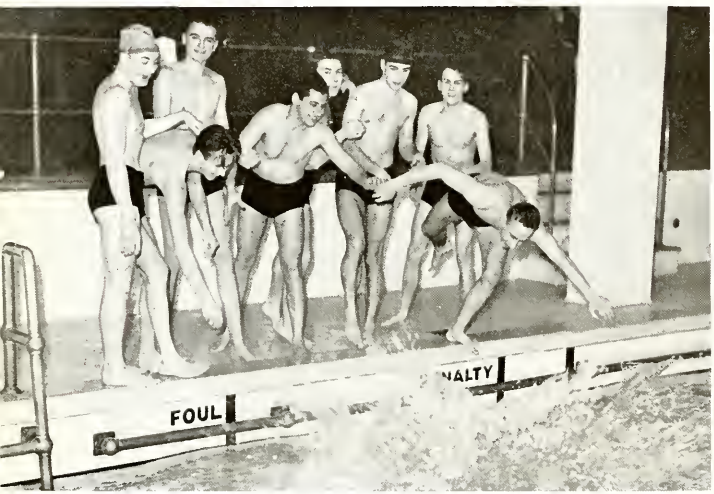
"Bad Boys" on "Hobo Day."

A scene from one of the recent productions of the Players.

Armour Tech has an excellent general library in addition to its valuable collections of books on technical subjects.

A view of some of the buildings.

A tense moment in a basketball game.



The swimming team relaxes.

At the Armour Tech Relays.

A LAST WORD

We are living in an engineering age. An engineer somewhere this morning tested and pumped the water which you used; others supervised the light in your bedroom, your automobile, and the train by which you left your home.

Another engineer had a hand in the manufacture of the fuel, as well as the machine (designed by another engineer) whereby your home is heated. The street, and the street railway, were laid out by engineers. The whole sweep of industry and manufacture involves engineers of many types.

It is true that engineers have played a prominent part in the development of America ever since its discovery; but as life becomes more complicated, engineers of greater diversity of attainments are needed. This need for engineers was early seen by Philip D. Armour, pioneer Chicago industrialist, who founded Armour Tech to provide opportunities for the youth of Chicago and also to raise up technical assistants to further the industrial progress which he saw coming to the Central West. Throughout all the years Armour Tech has had a close relationship with industry, training men for practical work in a group of professions.

You can join the ranks of these engineers if you have the determination to master the facts necessary to put you in command of a profession.

Armour Tech can help the man who really wants to get ahead.

You will find in the catalog a full description of courses. The Registrar will be glad to give full additional information, or call at the Institute.

****

Armour Institute of Technology

3300 Federal Street, Chicago, Ill.

Sports Review

Baseball . . . .

Armour's exponents of the "Great American Game" started the season, after getting most of their workouts in the gym, by losing to Chicago, 8-3. The next game, with Northwestern was lost, 12-3. The game's bright spot was the hurling of Kruse. He went in in the fifth and, his case of "gymnasium arm" seemingly completely cured, he set them down as fast as they came up to allow one hit and no runs. The next game, a return engagement with Chicago, was a heartbreaker we dropped in the last of the ninth. The team looked much better. Two hits and four errors tell all that needs to be told of the defeat by Northwestern's exceedingly wild Wildcats. Kruse pitched the first eight innings. Extra innings were not needed—the score was 9-1. One of the best games of the season to date was the slugfest North Central took from Armour. "Danny Boy" Delve, waived in the sixth in favor of Kruse, came back in the ninth, with the score tied, to relieve Kruse who hurt his pitching hand while batting in the eighth frame. With the willing co-operation of the Red Demons from North Central, "Danny Boy" and the aforementioned R. D.'s from N. C. had an Old Home Week. Delve's "uncle act" changed the R. D.'s, still from N. C., run total to twenty. 20 to 11 was the score.

Our ball team can look good, as they showed in the second Chicago game and in the North Central game. With warmer weather and, consequently, more regular practice we are looking to our team to play up to their capabilities and make their record more attractive.

* * *

Track . . . .

Thursday, March 5, our track team took a thriller from South Side Jr. College. The relay, the race that won the meet, was taken care of by Neuert, Ryan, Dunbar, and Neal. The one and one-half yard lead Dunbar tendered to Neal was "six-upped" by Neal, and we beat South Side by the final race. This seems to be a habit. This is the second time it has happened. Neal was high point man in this meet with 16¼ points. North Central beat Armour with a decidedly better team, 60-44, in our trackster's next meet. The meet was run off on Naperville's square, pardon me—rectangular, track. A bit of comic relief was provided when Faust of A. I. T. forgot to slow down for a turn and barged into the wall at one end of the fieldhouse. Neal was Armour's high point man with 8 markers. This meet ended the indoor track season except for the Relays. The record shows three wins, a loss, and a second in a triangular meet. It could be much worse, and it couldn't be much better. Congratulations, boys!

Armour, strong indoor, lost its first outdoor meet to Elmhurst. The hardies, who run on spikes, have been handicapped because of lack of practice by the recent inclement weather, but the 18 points gathered by Elmhurst in the discus and javelin events didn't help Armour's cause noticeably. If some stars in the two aforementioned events are not uncovered in the near future, we may look forward to seeing the Tech track team drop those close meets they stole in the indoor season.

* * *

Why Track Coaches Get Gray Hair So Soon Dept. . . . .

Here's an item from Ralph Cannon's Campus Canopy. "Leonard Dworsky, Michigan's track "find", never went out for track until after he transferred from *Armour*. He throws the javelin 198 feet." Listen . . . That's Track Coach Root's hair turning gray. 125 feet took first in the Elmhurst meet.

Meets with Morton and South Side Jr. Colleges, Bradley Polytech, Loyola, and Wheaton are in the offing and from here figure to be tossups. Don Neal, high point man so far this season, "Cap'n Bill" Concolino, Don Fleig, and Milton (Milty Wilty) Bejcek are four graduating seniors whom we shall miss next year.

* * *

Swimming . . . .

Nine meets last year . . . eleven this year. Average last year—.285 . . . average this year—.454. Congratulations, boys! (We seem to be doing a lot of congratulating. Every time a team wins a game another loses a game. Maybe our teams are better than most. Q. E. D.) Herb Ruekberg was recently elected next year's captain. Letters were awarded. Windblad and Dodge, season high point men, got minors. Knaus and Duerrstein received majors. Manke, Ruekberg, and "Shadow" Svagdis got minors.

* * *

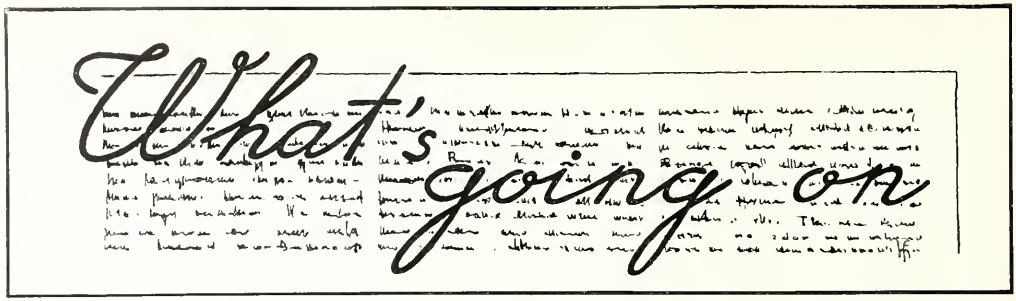
Tennis . . . .

Our raeketeers were soundly spanked in the season's opener at North Central. Practice on the fast hardwood courts of the Armory evidently is not good preparation for a match on clay. The second meet of the season was lost to Indiana State Teachers College, 6-1. Quandee, a senior, and Swanson, a freshman, are the only men yet to have won matches. Natinchek, another freshman, and Captain Arnold, are expected to fatten up the averages when they get into shape. Last year Arnold didn't lose a match.

* * *

Golf . . . .

Our club men have had one match and have lost one match. Northwestern U. was the executioner, 21-0. Anyway our golfers have been around.



Commencement, June 11

Lawrence A. Downs, President of the Illinois Central System, will deliver the commencement address at Mandel Hall, 57th St. and University Ave., June 11, at 4 P. M.

* * *

Freshman I. Q.

Something new at Armour. Entering freshmen are given an intelligence or achievement test, which will not affect their marks but will be used by the Institute in arranging courses of study.

* * *

Tech Relays Held

Saturday, March 21, saw the Armour Tech Relays, the eighth in a series of meets started by John J. Schommer, A. A. Stagg, Jr., and a small body of students. It was a larger and more brilliant success than its predecessors, even if Armour did come out on the short end of the score.

* * *

The Depression Is Over

According to latest reports, employment of graduates of June, 1935, has reached a high of 93.3 per cent. All of the Fire Protects and Electricals have been placed. Of the Civils, 95 per cent; of the Chemicals, 91 per cent; of the Mechanicals, 93 per cent; and of the Architects, about 80 per cent.

* * *

Armour Is Host to S.P.E.E.

With Armour acting as host, the annual meeting of the Illinois-Indiana Section of the Society for the Promotion of Engineering Education was held April 18 at the Lawson Y. M. C. A. Professor J. B. Finnegan, president of the section, called the meeting to order. The principal speakers were Professor Hardy Cross of the University of Illinois: "The Importance of Teaching School"; Mr. Lawrence A. Downs, President of the Illinois Central System: "Engineering Education as a Preparation for Business Responsibilities"; and Dean Henry T. Heald of Armour: "Part Time Courses for the Graduate Engineer."

* * *

Ten Scholarships to Be Offered

The freshman scholarship examination will be held May 23. Ten one-year scholarships covering the tuition for the year 1936-37, will be awarded.

* * *

Professor Hendricks Resigns as Head of Armour Players

After introducing dramatics into Armour's extra-curricular activities six years ago, developing an enthusiastic and efficient organization, building up an elaborate equipment, and presenting a number of excellent plays, Professor Walter Hendricks has given up the directorship of the Armour Players because of departmental activities and the editorship of the *Armour Engineer and Alumnus*. Prof. W. B. Fulghum, Instructor in English, has taken over the work.

* * *

Morrison Wins Tribune Scholarship

Peter Morrison, a junior in the electrical department, was awarded one of two $500 scholarships given by the *Chicago Daily Tribune*. This award, inaugurated last year, was designed to benefit the children of *Tribune* employes. Morrison is the son of Robert M. Morrison, chief engineer of the Tribune Tower. He ranks third in the junior class of 180 students.

Former Woodwork Instructor Dead

Nels P. Peterson, ex-student of the class of 1906, Instructor in Woodworking from 1905 to 1933, and father of R. A. Peterson, president of the Class of 1936, died April 21, 1936.

Milleville Wins Fellowship

Howard P. Milleville, a senior chemical, and chairman of the A. I. Ch. E., was recently awarded a Tau Beta Pi Fellowship, one of the highest honors an undergraduate engineer can receive. He is the first chemical engineer and the second Armour man to be so honored. Milleville will attend Columbia University.

* * *

Can This Be Used On Students?

An intricate piece of apparatus known as a densitometer is being constructed by the physics department. This instrument, which determines the density of photographic films, will be used in the course in Light.

* * *

Prof. Moreton Visits Engineering Schools and Industry

Professor D. P. Moreton spent three weeks studying major engineering schools of the East, investigating policies of graduate study, research, personnel, placement of graduates, and evening school work.

* * *

They're Growing Up!

Data obtained from physical exams of entering students has led to the conclusion that the average freshman shows an increase of two inches in chest expansion over the average of twelve years ago. This, along with the data that the general health is better, is attributed to greater participation in athletics.

* * *

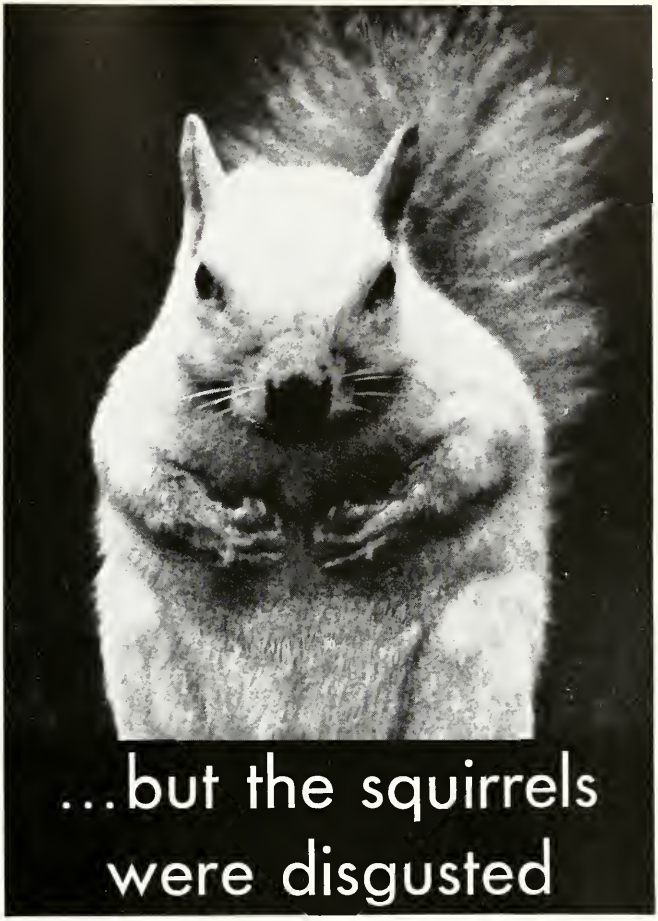
Mandel Hall Is the Place

Mandel Hall, at the University of Chicago, has been secured for the graduation ceremonies. Some new ideas are being proposed by the arrangement committee to change and liven up the exercises.

* * *

Open House Night

On Monday night, May 11, the faculty and students put on their annual show before thousands of visitors with great success. Many a prospective student will enter the Institute in September as a result.



TELEPHONE engineers had to find a way to stop gray squirrels gnawing holes in the lead sheath of telephone cables. Even a tiny hole may let in moisture—short circuit the wires—and put a number of telephones out of service temporarily. ℂ. Many ideas were tried, but the squirrels gnawed on. Finally the cables were painted with black asphaltum and sprinkled with sand. The gnawing stopped. ℂ. Not a major engineering problem, to be sure. But thousands of strange *little* problems, too, have been solved in order to assure you the world's fastest and most reliable telephone service.

Why not call your folks more often? For lowest rates to most points, call station-to-station after 7 P. M. daily or any time Sunday.

BELL TELEPHONE SYSTEM

Fraternity Notes

Theta Xi took honors in the scholastic averages the first semester, but they had close competition and will have to do better to keep first place. . . . A new cook at the *Phi Pi* house means that many of the alumni will miss Mrs. Buss, who was with them fourteen years. She returned last March to Germany. The fellows report that Mrs. Ostlund, who has taken her place, is turning out meals of the first order. . . . The *Delts* have revived their old paper, "The Exciter," and are sending it to all alumni and active men. . . . *Theta Xi* recently initiated two men, and *Triangle*, four. . . . *Pi Kaps* held a Monte Carlo party at their house on March 7. To the Chicago alumni chapter goes a large part of the credit for the success of the affair. . . . The Bismarck Hotel was the scene of *Theta Xi's* Founder's Day banquet. . . . *Triangle* followed suit with a similar celebration at the Engineers' Club. . . . The *Delts* had a very busy week-end, May 8-10: the Founders' Day celebration at the house, Friday; the Prom at the Bal Tabarin, Saturday; and the Mothers' Club entertainment, Sunday.

A number of the local chapters have had, or are planning, dances. On April 11, the Chicago Alumni chapter of *Pi Kappa Phi* held a dance at the LaSalle Hotel. . . . The *Rho Delts* will have their sixteenth annual dinner dance in the Mosaic Room of the Belden-Stratford Hotel, on May 23. . . . The Alumni of *Triangle* will be honored by a dance on May 29. . . . A June farewell dance for the graduating seniors is being planned by the *Phi Pi's*. . . . The respective chapters ask the support of alumni, actives, and pledges for these affairs. . . . The *Triangle* national convention was held in Cleveland, on April 23-25. Delegates and their wives were adequately entertained at the Deshler-Wallick Hotel. . . . The *Phi Kaps* and the *Pi Kaps* Mothers Clubs held meetings recently. The former elected officers, and the latter held a card party.

Activity personified was the order of Junior Week. . . . This year marked the beginning of a new activity, Fraternity Open-House. Many men who knew nothing of the fraternity situation saw for themselves what it really is. Certainly there will be a better understanding between fraternity and non-fraternity men after the house dances Tuesday night.

With Junior Week over, most of the fraternities will take a rest until next fall. We'll see you at that time with bigger and better FRATERNITY NOTES.

HABIT is a cable. We WEAVE a THREAD of it EVERY DAY, and at last WE CANNOT BREAK IT.

—Horace Mann.

MAKE the MOST of YOURSELF, for that is all there is of you.

—Emerson.

More Missing Men

NO, you're wrong again. These are not easualty lists from the jolly old wars. They are merely the names of other unobliging grads who have moved on to new diggings without telling us here, or why, or when, or how? Do you reeognize any of them? Have you seen them lately? Oh, you have! Let's hear about it. We can keep a seeret, if neeessary. But we must know where these fellows are hiding out, because we think so well of our new magazine we want them to receive a eopy (free), whether they want to or not. So, sit down, Tom, and Dick, and Harry, and write us a letter. Or, if you don't have time, jot down the facts on the baek of a guv'ment posteard (1e), and send it along.

Now, before we close, we want to thank all you loyal grads who took the time and trouble to set us straight on a lot of fellows from the list in the Mareh issue, to which, other alumni please refer. If you will also turn to the *Letter Box,* you'll find extracts from some of the letters sent in.

We've been working hard ourselves, too, and we've dug up a lot of new addresses, and we've cut down the list; but, lookee here, we're adding another bunch of names—which reminds us of the fable of the frog in the well—or was it a frog? and was it a well? Well, we'll forgive you if you'll only give us something to do. . . . Next fall, that is, in the October issue, and wait till you see it, we'll print another list, complete; and in the meantime you can help us keep down printing costs by cutting down the list.

By the way, are you eoming to the Alumni Banquet on June 2? Of course you are. What kind of an alumnus are you, anyway. Yahafta come!!! Make your reservation with D. P. Moreton, Secretary, at once. And get in touch with some of those Missing Men who don't even know about it, beeause they haven't been receiving our fine, new magazine. Why, we weep when we think of what they're missing. Oh, yes, and there'll be a couple of eleetions, too. So come and praetice up for November.

And, by the way, how about getting in touch with those graduating high school students (see Prof. Paul's urgent appeal on page 16), talking up your old school, and helping them to get started in the right direction? Aren't you glad someone told you about Armour Teeh? Of course, you are. We all are. So get busy, and do your part. THE ED.

1904
Coy, F. A., C.E.

1910
Thomas, W. E., M.E.

1913
Drozeski, D. A., M.E.

1923
Miller, O. F., E.E.

1924
Jarvis, F. E., C.E.

1925
Larkin, C. E., E.E.

1926
Larson, D. E., F.P.E.

1928
Higgins, E. J. S., Arch.
Kerr, W. W., C.E.
Rybicki, B., C.E.

1930
Beatty, S., F.P.E.

1931
Griffin, C. J., E.E.

1932
Eskonen, O., C.E.

1933
Cole, A., Arch.
Emling, C. A., Arch.
Johannisson, S., Ch.E.

1934
Cohrs, A. J., Ch.E.

In the LIMELIGHT

by Monfort

WILLIAM F. SIMS received his primary and secondary education in the Chicago public schools and the Chicago Manual Training School, respectively. From Armour Tech he received the degrees of B.S. in E.E. in 1897 and E.E. in 1903. He is a member of Phi Kappa Sigma fraternity.

After his graduation, Mr. Sims became an assistant engineer with the Chicago Telephone Company, and then with the Chicago Edison Company. Later, he was a field engineer with the Board of Supervising Engineers of Chicago Traction, and a construction engineer with Stone and Webster Engineering Corporation, supervising large construction jobs in various parts of the country.

In 1916, he began working for the Commonwealth Edison Company and became Engineer of the inside plant in 1930 and the Electrical Engineer in 1932.

Mr. Sims is a Fellow in the American Institute of Electrical Engineers, a member of the Western Society of Engineers and of numerous other professional societies.

His life is not all "strictly business," however, since he was in the Illinois Reserve Militia from 1917-1924, resigned as a Major; and he is at present a member of the Oak Park Area Council of the Boy Scouts of America. He also serves on the Safety Commission of River Forest, Illinois.

Mr. Sims gets his recreation at the River Forest Tennis Club and the Chicago Union League Club. He is Senior Warden of Christ Episcopal Church in River Forest, where he resides.

In the LIMELIGHT

by Monfort

In 1893, sixteen year old MAXIMILIAN WOLDENBERG reached America from Poland in his quest to make a place for himself. Determined to gain an engineering education, the young lad graduated from Crane High School, then the "English High and Manual Training School," and by 1906, had graduated from Armour with a B.S. degree. Immediately after leaving Armour he went to Switzerland to continue his education, and in 1908 he received a Ph.D. from the University of Zurich. Returning to Chicago, he organized the firm of Woldenberg and Schorr in which firm he was secretary-treasurer for seven consecutive years.

Becoming interested in the chemical industries, Dr. Woldenberg returned to Armour and took a Ch.E. degree in 1928. He has been president of the well known A. Daigger and Co. since 1916. Dr. Woldenberg's activities in Chicago's chemical industries are widespread and many. He is president of several large firms: the Mutual Paper Box Corp., the Hedges and Divine Zinc Co., the Cowen and Woldenberg Co., and the firm of Woldenberg and Fisher. He is chairman of the Chemical Committee of the Chamber of Commerce, a member of the Chemists Club of Chicago and of the Chicago Paint, Oil, and Drug Club.

Dr. Woldenberg's versatility extends well into many other fields of human endeavor. An extremely active and energetic man, he is a well known figure in Army circles, being Director of the Reserve Officers' Assn. of the Dept. of Ill., and a Lt. Col. of the Chemical Warfare Procurement Div., 6th Corps Area. He is editor of the *Home Laboratory Journal*, and a life member of the Chicago Art Institute.

Rare Books

(From page 6)

English school boy who studied geometry had not only to memorize all of the propositions in Latin but also use that language for their demonstration.

Record's arithmetic introduced the equal sign into the language of mathematics and also introduced the use of the + and − sign into England. D. E. Smith in his *Source Book of Mathematics* makes the statement: "His arithmetic . . . was by far the most influential of the early books upon the subject as far as English speaking peoples are concerned."

Rolle is known to most engineering students in connection with Rolle's Theorem. He uses this theorem in his algebra.

These books represent but a fraction of the splendid collection possessed by the Institute. Of necessity they are kept in one of the vaults. It is hoped that some day they may be more easily accessible to our students.

A FRIEND is one who WALKS IN when the rest of the world walks out.

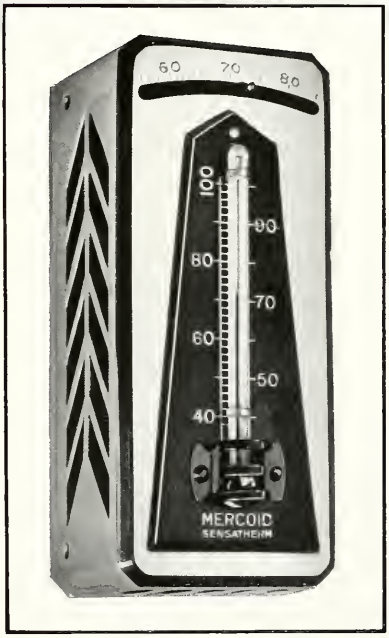
SOME DEFEATS ARE ONLY INSTALLMENTS TO VICTORY.
—Jacob A. Riis.

The BEST USE we can make of GOOD FORTUNE is to SHARE it with our fellows.
—Julian Hawthorne.

Our greatest GLORY is NOT in NEVER FAILING, but in RISING every time we fall.
—Confucius.

IMPORTANCE OF A MERCURY SWITCH

THE MERCOID SEALED MERCURY CONTACT SWITCH OFFERS THE MOST SCIENTIFIC MEANS FOR OPENING AND CLOSING AN ELECTRICAL CIRCUIT. IT CANNOT BE AFFECTED BY DUST, DIRT OR CORROSION. IT INSURES BETTER CONTROL PERFORMANCE WHICH MAKES SATISFIED CUSTOMERS. ALL MERCOID CONTROLS HAVE MERCURY CONTACT SWITCHES. THEY WILL OPERATE INDEFINITELY WITHOUT DETERIORATION.



MERCOID SENSATHERM

● The thermostat that is widely known for its sensitivity. The unique construction of the mercury switch (illustrated on top of page) in the Sensatherm, makes it possible to maintain an even room temperature without the assistance of any artificial acceleration.

● Extensively used with all types of automatic heating equipment. This instrument is beautiful in appearance and perfect in performance.

● The Mercoid Corporation have been pioneers in the automatic control field, and make a complete line of controls for heating, air conditioning, refrigeration and industrial applications. They are the sole manufacturers of The Mercoid Switch. Write for catalog No. 100-RA.

THE MERCOID CORPORATION ✦ 4201 BELMONT AVENUE ✦ CHICAGO, ILLINOIS

IT PAYS TO GET THE BEST

Do You Like the Weather?

(From page 8)

heating or cooling loads due to sunlight, other sources of heat adjacent to the space, and a wide variance of people and electric lights, make it necessary in many cases to zone various portions of a space if correct temperature and humidity are to be maintained.

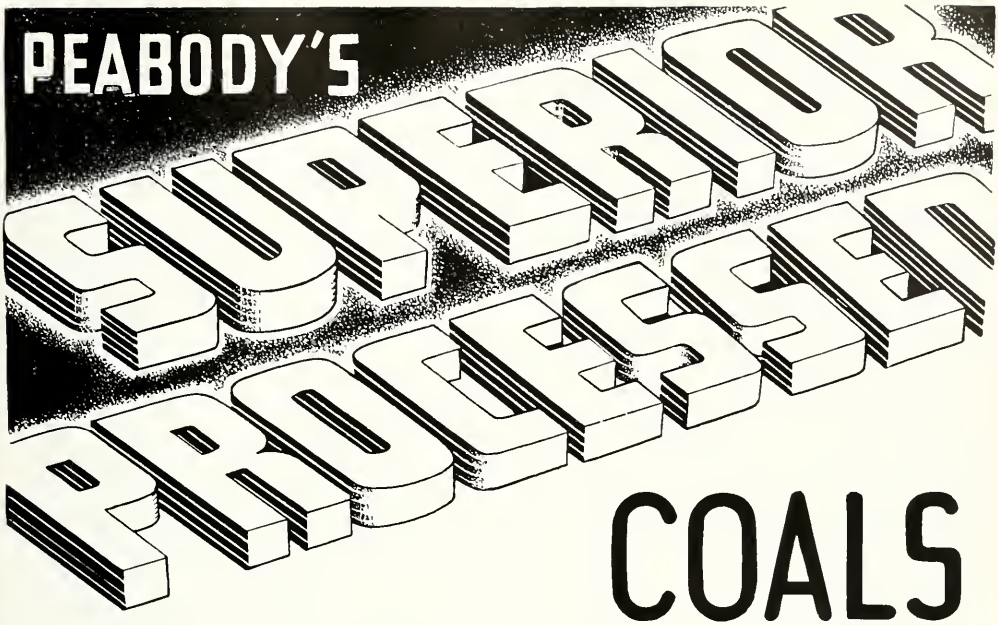
Such commercial applications of Manufactured Weather for comfort are of two classifications, the unitary type and the "built-up" central station type. In general, the complete office building installation is invariably of the central station type, utilizing a central plant for conditioning the air which later is distributed to all parts of the structure through ducts. In the case of a central station system for an old building, often each floor, or each half section of each floor, is handled by a unitary conditioner, supplied with cooling effect from a central cooling plant in the basement either through chilled water or brine.

For all other types of business space located in old or new buildings, there is available on the present market unitary air conditioning equipment which is factory built, guaranteed as to performance, durability, life, and quietness, by reputable manufacturers, soundly engineered and tested so that all guess-work is eliminated,—for air conditioning is an exact science. For summer use of these conditioners, there is also available a wide variety of self-contained refrigeration machines, commonly called, condensing units, driven electrically, and capable of being installed in the most cramped and out-of-the-way spaces.

The unitary type of air conditioner is in reality a factor for manufacturing weather, containing a filtering section, a humidifier and drip pan section, a coil section housing heating and cooling coils and sprays, and a fan section to handle the conditioned air.

Self-contained, room-cabinet type conditioners of the floor mounted type or the ceiling suspended type are quickly and cheaply installed. Circulation of air, cooling, and dehumidifying are its services in the summer, and winter operation can be arranged to provide space heating and humidifying. For both seasons, this source of heating or cooling effect must be from a boiler and refrigeration machine respectively.

(Turn to page 40)



Peabody's *Superior Processing* increases amazingly the efficiency of coal. This new method of cleaning and sizing completely removes all ultra-fines and free impurities, resulting in . . .

1. One-third lower ash content.
2. Increased B.t.u. value.
3. Elimination of pyrite.
4. Uniform air distribution throughout the fuel bed.
5. Elimination of fly ash.
6. Constant uniformity of sizing.
7. Elimination of all tramp metal.
8. Accelerated pick-up, all the way from banked fires to peak loads.

Peabody's *Superior Processed* Coals are breaking records for economical steam production. It will pay you to investigate their unusual possibilities.

S SUPERIOR MAJESTIC PROCESSED P

S SUPERIOR BLACK ARROW PROCESSED P

S SUPERIOR GAYLE PROCESSED P

S SUPERIOR HAWTHORN PROCESSED P

Do You Like the Weather?

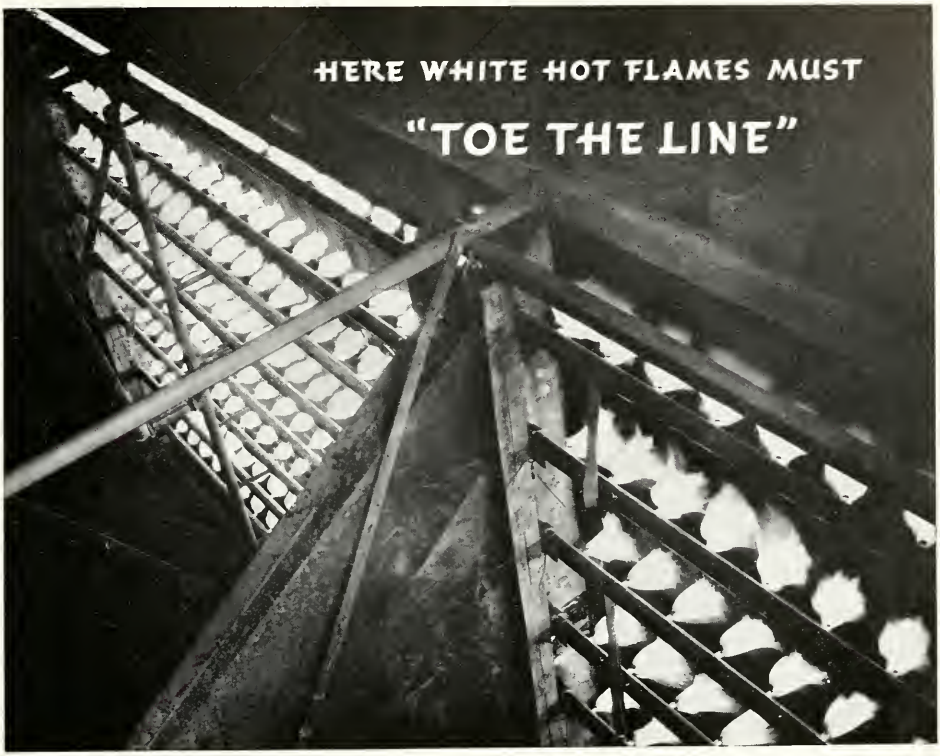
(From page 38)

The interest of the public in comfort cooling of public places is largely responsible for the development of a completely self-contained, portable, summer air conditioning unit of the cabinet type, which can be plugged into a light socket like a radio and presto—summer discomfort disappears. Such units must of necessity be placed in front of outside windows so that a source of air is available for ventilation and condenser usage. They are the answer to the public's demand for actual manufactured weather at a low initial cost.

There has been sore misuse of the term air conditioning, primarily because of the newness of the science. Fundamentally, true air conditioning is an application of the thermodynamics of air, and its psychrometric properties and their proper correlation. To the layman, this need not be confusing, for he can turn to technical minds to utilize these principles to supply that condition of atmosphere for his bodily comfort or for the products of his manufacture. To this end, the Air Conditioning Industry is pledged.

Do you like the weather? If you don't, something can be done about it.

ALUMNI BANQUET JUNE 2



CARBON black users know *Witco Blacks*. But few know how their remarkable uniform quality is maintained. The answer lies in the exacting care and precision *Witco* takes in their production. In the burner houses, for instance, the small lava tips that impinge the burning gas on the channels are slotted accurately to a thousandth of an inch. Continual inspection keeps them in A-1 condition. This is just one step in the whole process which is characterized by an elaborate series of tests and checks, retests and rechecks—each step analyzed again and again. Nothing is left undone to guarantee uniformity. Nothing is ignored that might improve quality. The *Witco* system is relentlessly exacting. That's why you who use *Witco* blacks are getting the most satisfactory results obtainable!

The care and precision which characterize the manufacture of *Witco* Carbon Blacks are reflected in the quality and uniformity of

WITCO STEARATES—Aluminum—Magnesium—Zinc—Calcium. Only high quality *Witco* Stearic Acids are used in the production of *Witco Stearates*. Thus, they are not only of exceptional purity but also of an unusually even, fluffy texture, entirely free of "greasy" lumps.

WITCO STEARITE is a new and highly important *Witco* contribution. It is more uniform than any other grade of Stearic Acid so far developed—yet it is lower in price!

WISHNICK-TUMPEER, INC.

Manufacturers and Importers

CHICAGO . . . . . 365 E. ILLINOIS STREET
NEW YORK . . . . 295 MADISON AVENUE
BOSTON . . . . . 141 MILK STREET
CLEVELAND . . 616 ST. CLAIR AVENUE N. E.

WITCO LTD., BUSH HOUSE, LONDON W. C. 2, ENGLAND

Witco Owned and Operated: The Pioneer Asphalt Company and the Panhandle Carbon Company

BUY DIRECT AND PROFIT DIRECTLY

WITCO

ELECTION OF ALUMNI OFFICERS

Extract from Alumni Constitution

Article X. Committee on Nominations

Section 1

Before April 15th of each year in which an election is to be held, the Board of Managers shall appoint a committee on nominations of five active members. Two members of this committee shall be selected from the Board of Managers and no other members of the committee shall be members of the Board of Managers. No two members of the committee shall be from the same class.

This committee shall prepare and transmit to the secretary-treasurer not later than the 15th of May, a written list of nominations for the various offices to be filled. The secretary-treasurer shall include this list, together with a statement that an election is to be held, in the announcement of the annual banquet for that year.

Article XI. Election of Officers

Section 1

Voting shall be from the floor at the annual banquet. The secretary-treasurer will supply ballots to the active members present. A plurality of votes cast shall elect. The president shall appoint a committee of three tellers of election to determine the ballot. This committee shall report to the president who shall in turn announce the results of the election before the adjournment of that meeting.

The nominating committee, appointed in accordance with article X, section I of the Constitution, presents for the consideration of the meeting to be held on the evening of June 2, 1936, the following slate.

President: John J. Schommer, Ch.E. 1912.
Vice-President: J. Warren McCaffrey, Ch.E. 1922.
Sec'y-Treas.: David P. Moreton, E.E. 1906.
Board of Managers:
Classes 1902-1906—Philip Harrington, E.E. 1906.
Classes 1912-1916—Arthur Katzinger, M.E. 1916.
Classes 1927-1931—Harvey C. Rossing, C.E. 1932.

Signed:

Alfred L. Eustice, E.E. 1907.
E. O. Griffenhagen, C.E. 1906.
Robert B. Harper, Ch.E. 1905.
Harold W. Munday, C.E. 1923.
Clinton E. Stryker, E.E. 1917.

Members of the Nominating Committee,
Armour Alumni Association, April 3, 1936.

ELECTION OF ALUMNI TRUSTEES

Extract from Alumni Constitution

Article XII. Alumni Members of the Board of Trustees

Section 1

The officers and Board of Trustees of Armour Institute of Technology have granted this Association the privilege of electing three alumni representatives to membership on the Board of Trustees who, with the President of the Alumni Association, will represent the alumni of Armour Institute of Technology on the Board of Trustees. This association shall elect the three alumni representatives to the Board of Trustees as follows:

(a) The Board of Managers shall nominate candidates for representatives and shall transmit to the secretary-treasurer not later than the 15th of April in each year in which an election is to be held, a written list of their nominations. The secretary-treasurer shall include this list, together with a statement that an election is to be held, in the announcement of the annual banquet for that year.

(b) Voting shall be by mailed ballot in the year in which the election is held, and shall be done as prescribed for the election of officers in Article XI.

(c) Each nominee shall be an active member of the Alumni Association of Armour Institute of Technology. A graduate or non-graduate of a class that has graduated five or more years prior to the date of election shall be eligible.

* * *

The Board of Managers of the Armour Institute of Technology Alumni Association submits, for the consideration of the alumni, the following brief biographical sketches of the three nominees.

One of these men is to be elected, by mailed ballot, by the general Alumni Association, to serve as an Alumni representative on the Board of Trustees. Please indicate your choice on the attached ballot. Detach and seal your ballot in a plain envelope. Place the plain envelope, without any writing or printing on it, in a second envelope with your name appearing on the outside of the second envelope, and mail *at once* to D. P. Moreton, Secretary-Treasurer, the Armour Institute of Technology Alumni Association, care of Armour Institute of Technology, 3300 Federal Street, Chicago, Illinois.

Signed:

Chas. W. Burcky, E.E. 1927.
Morris W. Lee, M.E. 1899.
E. F. Pohlman, Ch.E. 1910.
Henry W. Regensburger, M.E. 1920.
Louis A. Sanford, E.E. 1902
Clinton E. Stryker, E.E. 1917.
J. Albert Whittington, Ch.E. 1914.

Members of the Board of Managers,
Armour Alumni Association, April 3, 1936.

VOTE FOR ONE

Detach Here and Mail

☐ FRANKLIN DE BEERS

Chemical Engineering, 1905.

Age, 54 years.

Leader of Alumni Drive of 1926. President of Swenson Evap. Co. Now with F. de Beers Associates, manufacturing representative. Active in college extra-curricular activities. Editor of the *Integral*, now the *Cycle*.

☐ CLINTON E. STRYKER

Electrical Engineering, 1917.

Age, 41 years.

Professor in the Electrical Engineering Department at the Institute for several years. Formerly vice-president, general manager, and chief engineer of the Fansteel Metallurgical Co. of North Chicago. Now associated with McKinsey, Wellington, & Co., management engineering service.

☐ ROBERT WISHNICK

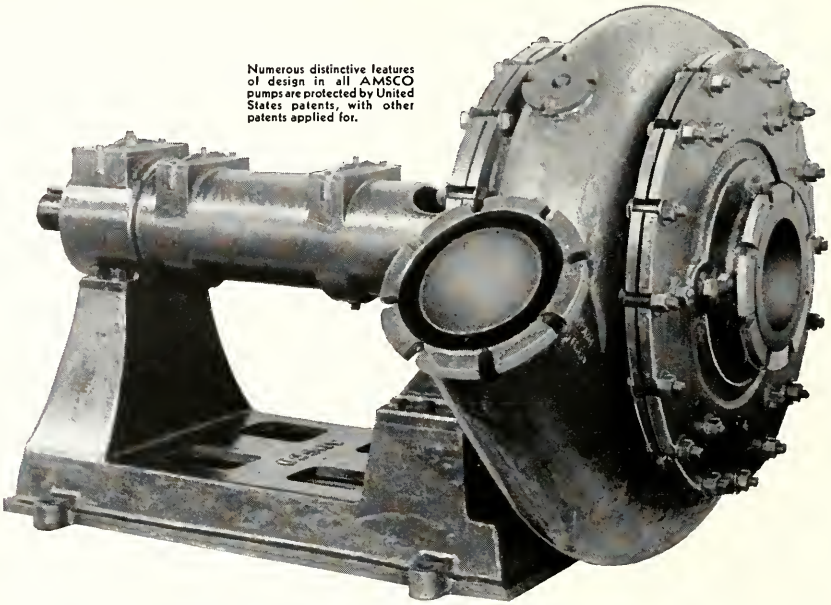
Chemical Engineering, 1914.

Age, 44 years.

Pres. Treas. Wishnick-Tumpeer, dealers in asphalts, carbon black, etc. President and director of many other corporations.

College: extra-curricular activities, none. Worked eight hours a day for money to attend college.

MATERIALS HANDLING PUMPS



Numerous distinctive features of design in all AMSCO pumps are protected by United States patents, with other patents applied for.

An 8-inch AMSCO Type "I", Form 26 Pump, Bare Design, Left Hand, 45 degree Upturn Discharge, made for direct connection to an Internal Combustion Engine with the entire Equipment Mounted on a Sub-Structure Base.

AMSCO Type "I" materials handling pumps fully meet the needs of Industry for long-service pumps, in small sizes of lighter design and moderate price, for pumping and conveying abrasive materials under conditions not requiring the AMSCO standard and heavy duty dredge pumps.

They are made in 3-inch, 4-inch, 5-inch, 6-inch and 8-inch sizes, in standard horizontal shaft designs, for all types of drives.

Numerous installations of AMSCO Type "I" pumps are today in use, pumping mill slurries and sludges, handling mine water; on ashes disposal in mine power plants and in many other applications pumping mixtures of water and practically every abrasive material.

All water end wearing parts are made of analytically controlled, scientifically heat treated AMSCO manganese steel, the "Toughest Steel Known", which, being unequalled for its shock and wear resistance, assures long time, trouble-free operation.

All AMSCO pumps embody: sturdiness with durable construction and lasting efficiency; simplicity and accessibility; ease of replacement of wearing parts; and remarkably high capacity under severe head conditions.

For high head and general dredging pump requirements, we make a complete line of AMSCO heavy duty dredge pumps, of horizontal shaft design, in a complete range of standard sizes for every type of drive.

We invite your inquiry for performance data and application details on AMSCO Type "I" materials handling pumps, and will gladly furnish descriptive bulletin to interested parties. Write for details today!

AMERICAN MANGANESE STEEL COMPANY

Division of American Brake Shoe & Foundry Company

376 East 14th Street

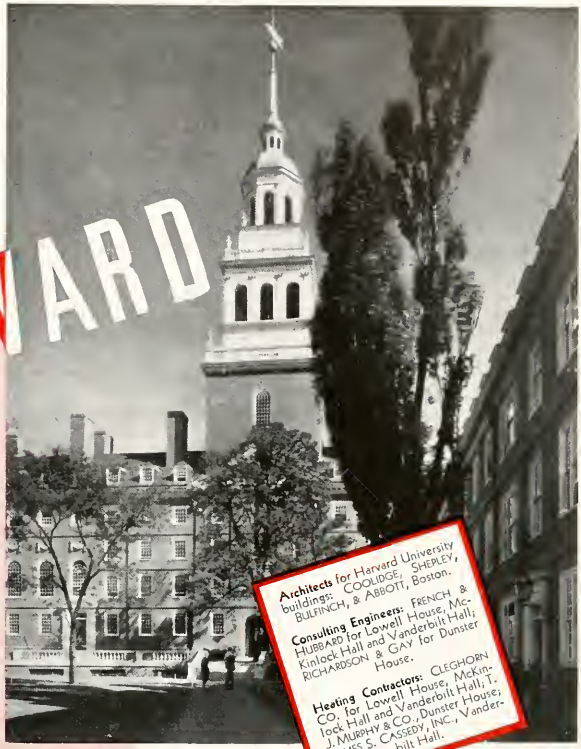
Foundries at Chicago Heights, Ill.; New Castle, Del.; Denver, Colo.; Oakland, Calif.; Los Angeles, Calif. • Offices in Principal Cities

Chicago Heights, Illinois

AMSCO

TRADE MARK REGISTERED

POWERS AT HARVARD



Architects for Harvard University buildings: COOLIDGE, SHEPLEY, BULFINCH, & ABBOTT, Boston.

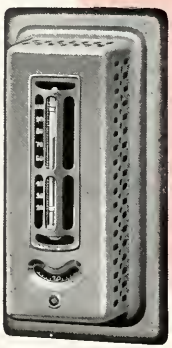
Consulting Engineers: FRENCH & HUBBARD for Lowell House; McKinlock Hall and Vanderbilt Hall; RICHARDSON & GAY for Dunster House.

Heating Contractors: CLEGHORN CO. for Lowell House, McKinlock Hall and Vanderbilt Hall; T. J. MURPHY & CO., Dunster House; JAMES S. CASSEDY, INC., Vanderbilt Hall.

At Harvard, Yale, Princeton, Vassar, Wellesley, and hundreds of other prominent educational institutions will be faund buildings equipped with the Powers system af automatic temperature control.

Over 40 years of experience in developing and installing automatic control for heating, ventilating and air conditioning equipment in all types of buildings, such as those illustrated here and listed below, qualify us to assist architects and engineers on any problem of temperature and humidity regulation.

The Powers Regulator Co., 231 East 46th St., New York; 2720 Greenview Avenue, Chicago —Offices in 43 Cities in the U.S.A. and Canada.



15 to 20 years of dependable control without repair expense is often reported by users of Powers Control. This is due to the SERVICE we build into our equipment—the great care used in proper installation—the frequent inspections to check up performonce—a service that continues throughout the life of the building.

Lowell House (above)
Dunster House (at the left)

In both of these buildings Powers equipment automatically regulates temperature of ventilating systems and direct radiation. Hot water heaters in the Dunster House are also Powers controlled.

McKinlock Hall—Powers control regulates temperature of direct radiation and hot water heater.

Vanderbilt Hall—Harvard Medical School—Ventilating system and direct radiation regulated by Powers Control.

POWERS TEMPERATURE AND HUMIDITY CONTROL

. . . Meets all the rapidly growing demands of the Air Conditioning Industry

Powers control used in—Chrysler and Empire State Buildings . . . Du Pont Rayon Mills . . . Rockefeller Center . . . J. D. Rockefeller Residence . . . Berkshire Knitting Mills Sears Roebuck & Co.'s new completely air conditioned windowless store in Chicago . . . White House Executive Offices . . . New U. S. Post Office Building, Washington, D. C.